THE INSTITUTE OF MOTOR INDUSTRY (I)

SYLLABUS FOR STUDENTSHIP

Note: Any single textbook is not available for the subject of the syllabus. A very wide range of books are published on all aspects of the various subjects of the syllabus and there are too many to list. No one text/book cover an entire syllabus. Therefore, in order to provide an adequate coverage for each syllabus, it will be necessary to refer several textbooks. Anyway we have recommended some references which covers maximum contents prescribed in the syllabus.

AMD00 S01 – ENGLISH

MAJOR DIVISIONS:

UNIT I - Vocabulary
UNIT II - Grammar
UNIT III - Compound Nouns
UNIT IV - Prepositions
UNIT V - Subject and Verb Conditional Structure
UNIT VI - Listening Comprehension
UNIT VII - Reading Comprehension and Report Writing
UNIT VIII - Letter Writing
UNIT IX - Essay Writing
UNIT X - Rhetorical Functions

UNIT I: Vocabulary

Vocabulary - using words in context - use of suffixes to form nouns from verbs and adjectives – adjectives, adverbs - matching words with meanings - Active and passive voices – tenses - simple present, present continuous - comparative adjectives – adverbial forms - Reading text: skimming for general information - specific details – note making.

UNIT II: Grammar

Noun – Adjective – Transformation of degree of comparison when two things are compared – verbs – Modals – Main verbs – Simple Present – Present Continuous and Past Continuous – Past Continuous Tense – Present Perfect Tense – Simple Past Tense – Present Continuous Tense – Past Perfect Continuous Tense – Simple future Tense – Future Continuous Tense.

UNIT III: Compound Nouns

Compound nouns - negative prefixes – antonyms – Use of modal verbs – making sentences using phrases – tenses – simple past and present perfect - Reading and guessing meanings in context - Listening and note taking - Channel conversion from text to chart - Writing comparisons - making recommendations - coherence using discourse markers - Discussion - role-play.

UNIT IV: Prepositions

Expanding nominal compounds – words with multiple meanings – Error correction - prepositions - use of the prefix “trans-“ - compound adjectives - modal verbs to express probability - simple past and present prefect.

UNIT V: Subject and Verb Conditional Structures

Purpose – Preposition – Preposition + relative structure – Adverb – Gerund – Connective – Active voice and Passive voice – Abbreviation – General Abbreviations used in dictionaries – Abbreviation used in project work and Research papers – Definitions – Punctuation – Units – synonyms and Antonyms – Error Detection/Correction.

UNIT VI: Listening Comprehension

Accuracy in listening – listening to discussion on specific issues - Group discussion – Role playing (stating, discussing problems and proposing solutions).

UNIT VII: Reading Comprehension and Report Writing

Language – Learning Objectives – Cleaning up Mercury – Soft Started Motors – Journey through a Virus – Radioactive Waste Piles on – Rapid Heating furnaces Save Energy – Instruction – Impersonal Passive – Laboratory Report Writing

UNIT VIII: Letter Writing

Kinds of Letters – Official and Business Letters – Official Letters – Letter of application for job – Letter of Complaint – Letter inviting dignitaries to attend a function letter to industries requesting permission to undergo practical training – Letter to the Editor – Business Letters – Quotation.

UNIT IX: Essay Writing

Paragraph writing – Features – Preparation of outline – Model essays and exercises.

UNIT X: Rhetorical Functions

Description of machines and functions of parts and the use of signs and symbols – Classification – Expressing causality – Use of tools and units of measurement – Starting problems and suggesting solutions – Making recommendations – Narrating events and stories – Writing check lists and giving instructions.

Reference books:

English for Engineering Students	- M. Balasubramanian & G. Anbalagan & Wren & Martin
Learning to Communicate – A Resource Book for Engineers and Technologists	- Dr. V. Chellammal, Anna University, Kamakhya Publications, 2001
Intermediate Grammar for Asian Students	- Raymond Murphy, 2000

AMD00 S02 – GENERAL MATHEMATICS – I

MAJOR DIVISIONS:

UNIT I	- Applications of Matrices and Determinants
UNIT II	- Counting Algebra
UNIT III	- Binomial Theorem
UNIT IV	- Vector Algebra
UNIT V	- Complex Numbers
UNIT VI	- Analytical Geometry
UNIT VII	- Applications of Differentiation
UNIT VIII	- Applications of Integration
UNIT IX	- Differential Equations
UNIT X	- Probability Distributions

UNIT I: Applications of Matrices and Determinants

Adjoint and inverse of matrix – Properties, computation of inverses, solution of system of linear equations – Matrix inversion method – Rank of a matrix – Elementary transformation – Consistency of a system of linear equations – Cramer's rule – Non-homogeneous equations – Homogeneous linear system – Rank method.

UNIT II: Counting Algebra

Fundamental principle of counting – Factorial –Permutation – Circular permutations – Combinations – Principle of mathematical induction.

UNIT III: Binomial Theorem

Binomial theorem for rational index – Proof only for integral value only – Term independency of variable – Approximation – Simple problems.

UNIT IV: Vector Algebra

Vectors and Scalars – Representations of vectors – Operations of addition and subtractions – Scalar and vector products – Triple products and products vectors – Applications to mechanics – Applications to geometry – Parallel & perpendicular vectors – Angle between lines – Equations of lines and planes – Equation of sphere.

UNIT V: Complex Numbers

Complex Algebra – Fundamental operations on complex numbers - Ability to separate real and imaginary parts – Compute absolute value – Multiplicative inverse of a complex number – Conjugation – Triangle inequality – Applications - De Moivre's theorem – Roots of a complex number – Euler formula – Statement and meaning of fundamental theory of complex algebra.

UNIT VI: Analytical Geometry

Definition of a conic - Derivation of the standard equation of Parabola, Ellipse, Hyperbola and rectangle hyperbola - Chords, tangents and normals – Parametric representation – Asymptotes.

UNIT VII: Applications of Differentiation

Derivative as a rate measurer – Derivative as a measure of slope – Maxima and minima – Mean Value Theorems – Errors and approximations – Curve tracing – Partial derivatives.

UNIT VIII: Applications of Integration

Definite integral – Identifying definite integral as the limit of a sum – Properties of definite integral – Application of definite integral – Area under a curve – Length of are of a curve – Surface and volume of revolution.

UNIT IX: Differential Equations

Formation of differential equations – First order: Variables separable, homogeneous equation, exact equations, linear equations – Second order linear equations with constant coefficient – Geometrical applications involving slope, tangent normal – Simple applications – Movement of a particle, radioactive decay, heat conduction, electric circuits.

UNIT X: Probability Distributions

Random variable – Probability density function – Distribution function – Mathematical expectation – Variance – Discrete distributions – Binomial and Poisson continuous distribution – Normal distribution.

Reference books:

1. Text Book of Practical Mathematics - I.B. Prasad, Khanna Publishers, Delhi
2. Engineering Mathematics - H. K. Dass, S. Chand & Company
3. Higher Engineering Mathematics - B.S. Grewal, Khanna Publishers, New Delhi 34^{th} edition, (1999)
4. Text Book of classes XI and XII - CBSE Mathematics

AMD00 S03 – ENGINEERING MATHEMATICS – II

MAJOR DIVISIONS:

UNIT I	- Fundamentals of Trigonometry
UNIT II	- Limits, Functions, and Continuity
UNIT III	- Functions of Several Variables
UNIT IV	- Infinite Series
UNIT V	- Differential Calculus-Applications I
UNIT VI	- Differential Calculus-Applications II
UNIT VII	- Integral Calculus and its Applications
UNIT VIII	- Improper Integrals and Multiple Integrals
UNIT IX	- Definite Integrals and Differential Equations
UNIT X	- Matrices

UNIT I: Fundamentals of Trigonometry

Angles in degrees and radians – relation between radians and degrees – Trigonometric ratios– Trigonometrically identities – Addition formulae for Trigonometric functions – Inverse trigonometric functions – relation between sides and angles of a triangle – sine formula, Napier's formula, cosine formula – Area of a triangles – solution of triangles – simple problems.

UNIT II: Limits, Functions and Continuity

Functions – limit of a function – evaluation of limits – L' Hospital rule – Definition of a Function – Definition and computation of Limits – Definition of the derivative – Computation methods of derivatives – Derivatives of polynomials – Instantaneous rates of change: Technical Applications – Product, quotient and generalized power rules.

UNIT III: Functions of Several Variables

Partial derivatives – Homogeneous functions and Euler's theorem – Total derivative – Differentiation of implicit functions – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Errors and approximations – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT IV: Infinite Series

Sequences – Convergence of series – General properties – Series of positive terms – Tests of convergence (Comparison test, Integral test, Comparison of ratios and D'Alembert's ratio test) – Alternating series – Series of positive and negative terms – Absolute and conditional convergence – Power Series – Convergence of exponential, logarithmic and Binomial Series.

UNIT V: Differential Calculus – Applications I

Derivative of a function – physical meaning of derivatives – Geometrical meaning of derivatives – Differentiation from first principles – Differentiation rules – Differentiation of a function – Addition rules – product rules – quotient rules – Differentiation of Implicit functions – Logarithmic differentiation – Differentiation of parametric – Maxima and Minima. Mean value theorem – Rolle's Theorem – Lagrange Mean value Thorem – Taylor's and Maclaurin's series, I Hopital's rule, stationary points – increasing , decreasing , maxima, minima, concavity convexity, points of inflexion.

UNIT VI: Differential Calculus - Applications Ii

In – Rate of change – tangent and normal – monotonicity of functions (increasing and Decreasing functions) – maxima and minima of functions – simple problems – Errors and approximations – absolute, relative, percentage errors, curve tracing, partial derivatives – Euler's theorem.

UNIT VII: Integral Calculus and its Applications

Integration as the inverse process of differentiation – Basic rules of integration – Different types of integration – Integration by substitution – Integration by parts – Properties of definite integrals – Reduction formulae - Area, length, volume and surface area.

UNIT VIII: Improper Integrals and Multiple Integrals

Improper integrals of the first and second kind and their convergence – Evaluation of integrals involving a parameter by Leibnitz rule – Beta and Gamma functions – Properties – Evaluation of integrals using Beta and Gamma functions – Error functions - Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of Solids – Change of variables in double and triple integrals – Area of a curved surface.

UNIT IX: Definite Integrals and Differential Equations

Definite integral – Definite integral as the limit of a sum – properties of definite integral – simple problems Formation of differential equations, order and degree, solving differential equations (First order) – variable separable homogeneous, linear equations, Second order linear equations with constant co-efficient.

UNIT X: Matrices

Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors – Cayley-Hamilton Theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

Reference books:

1. A test Book Practical Mathematics - I.B. Prasad, Khanna Publishers , Delhi
2. Engineering Mathematics - H.K. Dass, S. Chand & Company
3. Higher Engineering Mathematics - B.S. Grewal, Khanna Publishers, New Delhi 34th edition, (1999)
4. Text Book of classes XI and XII - CBSE Mathematics

AMD00 S04 PHYSICS

MAJOR DIVISIONS:

UNIT I	-	Measurement
UNIT II	-	Mechanics
UNIT III	-	Properties of Matter
UNIT IV	-	Thermodynamics
UNIT V	-	Sound
UNIT VI	-	Light
UNIT VII	-	Magnetism
UNIT VIII	-	Electricity and Electromagnetism
UNIT IX	-	Atomic Physics and Nuclear Physics
UNIT X	-	Electronics

UNIT I: Measurement

Fundamental and derived quantities – SI units – significance. SI unit of Length, Mass and time. Dimentions – uses and Limitations, Vernier Caliper and screw gauge.

UNIT II: Mechanics

Scalar, vector quantities, Triangle law, Polygon law, Parallelogram law of vectors, Projectile – Horizontal and oblique projection. Angular Displacement, Angular Acceleration. Motion of a cyclist in round circular track. Moment of inertia, Moment of inertia of uniform rod.

UNIT III: Properties of Matter

Introduction, Elasticity – stress and strain – Hooke's law – Module of elasticity – Young bulk and Rigidity modulus – Bending a beam – Surface tension – examples – Rise of a liquid in Capillary tube – Determining the surface tension of water Experiment – Capillary rise method Viscosity stream line and Turbulent flow. Stocke's formula – Berboullie's theorem (Statement Only)

UNIT IV: Thermodynamics

Postulation of kinetic theory of gases – I and II law of thermodynamics – Isothermal and adiabatic process – Reversible and Irreversible process – Carnot Engine – Expression for efficiency – Black body – Emissive power – Absorptive power and Kirchoff's law – Definitions

UNIT V: Sound

Simple Harmonic motion – Oscillations of simple pendulum – Free oscillation – Damped and forced oscillations – Resonance – Transverse and longitudinal waves – Velocity of sound in Gases – Newton's formula and Laplace correction

UNIT VI: Light

Nature of light – corpuscular theory – Wave theory – Electromagnetic theory and Quantum theory – Interference – Newton's Ring Experiment – Diffraction Freshnel and Fraunhofer diffraction – Polarisation – Brewster's law – Double Refraction

UNIT VII: Magnetism

Introduction – Magnetic pole – Magnetic field – Magnetic Moment – Tangent galvanometer – Tan A, Tan B position (Formula only) – Hysterestis loop Boit Savarat law – Magnetic Induction at a point due to conductor carrying current (derivation need not be given) – Lorentz force.

UNIT VIII: Electricity and Electromagnetism

Couloumb's inverse square law – Electric field and Electric potential due to a point Charge – Gauss law – Resistance and capacitors in series and parallel connections – Definitions of current and ampere – Ohm's Law – Kirchoff's law (Statement only) – Joule's law of heat – Moving coil Galvanometer. Conversion of galvanometer into ammeter and Voltmeter – Electromagnetic induction, a.c. and d.c. generators, transformers.

UNIT IX: Atomic Physics and Nuclear Physics

Atomic Number – Mass Number – Atomic mass unit – Cathode rays – properties – Bragg's law – X –rays – Photo electric effect (Definition) Radioactivity uses of Radio isotopes – Radio carbon dating – Nuclear fission and Nuclear fusion – Nuclear Reactor

UNIT X: Electronics

Energy band in solids – conductors, semi conductors and Insulators – Extrinsic and Intrinsic – P-type and N-type semi conductors – PN – Junction Diode – Forward – Reverse bias – characteristics of Diodes – Diode as Rectifier (Half Wave and Full Wave) – Transistor Types – Biasing of Transistor – Transistor circuit configuration – Transistor static characteristic – Logic Gates – NAND – NOR as universal gates – IC's linear and digital

Reference books:

1. For all units except Electronics - Birjlal and Subramanyam
2. Physics for Engineers - Gaur and Gupta
3. Heat and Thermodynamics - Barilla and Subramanyam
4. For atomic and nuclear Physics - R. Murugesan
5. Basic Electronics - Tayal
6. Introduction to Electronics - A. Amrose & T. Vincent Devaraj

AMD00 S05 – CHEMISTRY

MAJOR DIVISONS:

UNIT I	- Periodic Classification and Properties
UNIT II	- Co – Ordination Compounds
UNIT III	- Chemical Bonding
UNIT IV	- Dilute Solutions
UNIT V	- Chemical Kinetics and Catalysis
UNIT VI	- Electrochemistry
UNIT VII	- Organic, Halogen, and Hydroxy Compounds
UNIT VIII	- Carbonyl and Carboxylic acid Compounds
UNIT IX	- Nitrogen Compounds
UNIT X	- Chemistry for Human Welfare

UNIT I: Periodic Classification and Properties

Introduction – Atomic Structure – Quantum numbers Principle – Azimuthal, Magnetic, Spin – Definitions – Pauli's exclusion principle – Hund's Rule – Aufbau principle – Definitions – Periodic Classifications – Oxides formation – Individual compounds – Phosphine – preparation – properties and uses – Borax – preparation from colemanite – properties – Borax bead Test – D-Block elements – General characteristics – Electronic configuration – Atomic radii – Ionic radii metallic character – Ionic radii – lanthanide constraction & uses – Periodic properties – Atomic radii – Ionisation energy – electron affinity – electro – negativity – Definitions

UNIT II: Co-Ordination Compounds

Types of salts – Molecular compounds – Double salts – co-ordination compounds – Terminology used in coordination theory – central metal ion – Ligands – Types of Ligands – negative ligand – neutral ligand – co-ordination number – co-ordination sphere – charge on the complex – Werner's Theory of co-ordination compounds – structure of complexes.

UNIT III: Chemical Bonding

Types of bonding – Ionic, covalent and co-ordinate bondings and characteristics of these bonds with examples – Hybridisation – Principle and significance – VSEPR theory – shape, structure, valance angle- Fajan's Rule – Definition, partial Ionic character – definition and examples.

UNIT IV: Dilute Solutions

Introduction – collegative properties – Lowering of vapour pressure – Ostwald & Walkers method – definition – elevation of boiling point (ΔTb) – Graph – definition – determination by cottrell's apparatus – Depression in freezing point (ΔTf) definition – Graph – Beckman Thermometer method – Osmotic pressure definition – determine by Berkeley and Hartley's method – Laws of Osmotic pressure.

UNIT V: Chemical Kinetics and Catalysis

Introduction – Reaction Rate – order of Reaction – definitions – First order reaction – derivation and characteristics – Half – life period – Graph – Energy of Activation – Graph & definition – Factors affecting the Rate of the Reaction – Temperature – Nature of Reactants – Catalyst – Concentrations of reacting species – Nature of solvent used – Theories of catalysis – Intermediate compound formation theory and absorption theory

UNIT VI: Electro Chemistry

Introduction – Conductors, Insulators – Faraday's I^{st} and II^{nd} law of electrolysis – Definition & equation of conductance – cell constant – specific conductance & Resistance – Arrhenius Theory of Ionisation – postulates and Limitations – Definition & derivatives of Oswald dilution law and common Ion effect with example – pH definition – Buffer solution definition and derivative of pH of buffer by – Henderson equation – Definition of Acid & Bases by Lewis concept – Arrhenius concepts.

UNIT VII: Organic , Halogen and Hydroxy Compounds

Introduction – Nomenclature – classification – primary, secondary and Tertiary compounds - Substitution and Elimination mechanisms – Grignard Reagent - preparation & properties of alcohol, ester, keytone, acids - Victor Meyer method – Individual compounds – Glycerol – preparation from propylene & saponification – Properties and uses – Phenol – preparations – Dow's process – properties – Reimer Tieman Reaction – Kolbe's Reaction – coupling reaction – electrophilic substitution reaction – reduction and Oxidation.

UNIT VIII: Carbonyl and Carboxylic Acid Compounds

Introduction – Nomenclature – classification – a) Aliphatic aldehydes & Ketones, Aromatic aldehyde & Ketone, carboxylic acids – Aliphatic & Aromatic – Mono & Dicarboxylic acid – Aldehydes – Acetaldehyde and Benzaldehyde – preparation – properties and uses. – Ketones – Acetone and Acetophenone – preparation – properties and uses – Carboxylic acid – Benzoic acid – preparation properties and uses – Optical activity and isomerism – of lactic acid and Tartaric acid – Internal and External compensation

UNIT IX: Nitrogen Compounds

Introduction – Nomenclature – classification – Amine, Nitro compounds amides, Nitriles, diazonium salt, amino acids – examples – Individuals compounds – Benzene diazonium chloride – preparation – properties and uses – Aniline – preparation – properties & uses – Amino acides – peptides – proteins peptide linkages – example Glycine, alanine.

UNIT X: Chemistry for Human Welfare

Fuels – classification – characteristic – calorific value of fuels – composition & uses of coal gas, producer gas, water gas, LPG, Gobar gas – Fertilizers – Characteristic of fertilizers – Explosives – characteristics of explosive classification – examples – TNT, picric Acid – Nitroglycerine – Preparation and uses – Polymers – Plastics – classification – Thermosetting & Thermoplastics – examples Bakelite, Polyethylene – Medicinal Chemistry – Significance and applications.

Reference books:

1. Inorganic Chemistry - Puri & Sharma
2. Physical Chemistry - Puri & Sharma
3. Organic Chemistry - P.L. Soni
4. Advanced Organic Chemistry - Jerry March
5. Organic Chemistry - B.S. Bhal and run Bhal
6. Polymer Science - Gawrikar

AMD00 S06 COMPUTER PROGRAMMING & PRACTICE

MAJOR DIVISIONS:

UNIT I	-	History of Computers
UNIT II	-	Computer basics
UNIT III	-	Computer Memory
UNIT IV	-	Peripheral Devices
UNIT V	-	Computer types
UNIT VI	-	Microcomputers
UNIT VII	-	Data Representation
UNIT VIII	-	Logic Circuits
UNIT IX	-	Operating Systems
UNIT X	-	Computer Languages

UNIT I: History of Computers

Year of invention – name of the inventor and specialty – abacus – slide rule – arithmetic engine – analytical engine – difference engine - tabulating machine – electronic computer – contributions of Pascal – Charles Babbage – Lady Ada Lovelace and John Von Newmann – Computer generations – components used in I, II, III, IV and V generation computers.

UNIT II: Computer Basics

Definition of computer – Characteristics of Computers – speed – accuracy – memory diligence – automation and versatility – hardware – software – block diagram of a personal computer – Central Processing Unit (CPU) – Arithmetic – memory – control units – input and output units – Secondary memory – general idea about Personal computers.

UNIT III: Computer Memory

Meanings of bite – byte – word – kilo byte – mega byte – giga byte – semiconductor memory – definition and purpose of RAM – ROM – EPROM – EEPROM – typical RAM capacities in personal computers – floppy disks – usage – sizes and capacities - organization of floppy disks – tracks – sectors – index hole – write protect notch – hard disks – usage – capacities – organization of hard disks – sides – cylinders - heads – sectors – Compact Disk Read Only Memory (CD – ROM) drive – usage – capacities and organization – magnetic tape drives.

UNIT IV: Peripheral Devices

Definition – usage of Input devices – keyboard – mouse – OCR – MICR – Output devices – Visual Display Unit (VDU) – dot matrix printers – inkjet printers – pen plotters.

UNIT V: Computer Types

Definition – application and examples of analog – digital and hybrid computers – classification based on computer power – micro – mini – mainframe and super computers – Network of LAN – WAN – E-mail – Intranet and Internet.

UNIT VI: Microcomputers

Ideal and actual microcomputers – Memory systems – minimum configuration – evolution of microcomputers – special purpose microcomputer software applications.

UNIT VII: Data Representation

Binary – Octal and Hexadecimal number systems – conversions – Binary addition – subtraction – multiplication – division – simple problems.

UNIT VIII: Logic Circuits

Introduction – Switching circuits – AND/OR Operations – NOT Operation – Boolean functions – Postulates – Duality Principle – Theorems – Precedence of Operations – Venn Diagram – Truth Table – Canonical forms for Boolean functions – Logic circuits – Parallel and serial Adders – Physical Devices used to construct Gates – Transistors – Integrated circuits.

UNIT IX: Operating Systems

Fundamentals – Mode of operations – Batch – Online – Time sharing – Real time – Personal Computer operating systems – DOS – UNIX – WINDOWS – WINDOWS NT.

UNIT X: Computer Languages

High level language – low level language – assembly language – transistors – source program – object program – compiler – interpreter – assembler – comparison of high level – low level and assembly languages – introduction and applications of BASIC – FROTRAN – COBOL – PASCAL – C and PROLOG.

Reference books:

Fundamentals of Computers (2nd ED.) - V. Rajaraman
Elements of computer Science - M. Ramaswamy

SECTION - A
AMD00 A01 – ENGINEERING DRAWING

MAJOR DIVISIONS:

UNIT I	- Curves
UNIT II	- Orthographic Projection
UNIT III	- Solid Geometry
UNIT IV	- Sections of Solids
UNIT V	- Development of Solid Surfaces
UNIT VI	- Interpenetration of Solids
UNIT VII	- Isometric Projections
UNIT VIII	- Terminology of Fasteners
UNIT IX	- Fits and Tolerances
UNIT X	- Joints

UNIT I: Curves

Conic Sections – Ellipse – General Methods of construction of an ellipse – Construction of ellipse by other methods- Normal and tangent to an ellipse- Parabola – General Method of Construction of a Parabola – Construction of Parabola by other methods- Hyperbola- Rectangular Hyperbola – Cycloidal Curves - cycloid – Normal and tangents to a Cycloid curve- Trochoid – Epicycloid and Hypocycloid – Normal and a tangent to an epicycloids and Hypocycloid – epitrochoid – Hypotrochoid – Involute – Normal and tangent to an involute – Evolutes – Spirals – Archemedian spiral – Normal and tangent to an Archemedian spiral – Logarithmic or equiangular spiral – Helix – Drawing methods – Helical curve- Helical springs – helical spring of a wire of square cross-section - Helical spring of a wire of circular cross- section- Screw threads – Helix upon a cone – Cam.

UNIT II: ORTHOGRAPHIC PROJECTION

Principle of Projection – Methods of projection - Orthographic Projection – Planes of Projection – Four Quadrants – First –angle Projection – Third-angle Projections - Reference line – symbols for methods of Projection – B.I.S. code of practice – Conventions of employed.

UNIT III: Solid Geometry

Types of solids - Polyhedral – solids of revolution – Projections of solids in simple positions- Axis Perpendicular to the H.P.- Axis Perpendicular to the V.P – Axis parallel to both the H.P and the V.P – Projections of solids with axes inclines to one of the reference planes and parallel to the other – Alteration of position – Alteration of reference line or auxiliary plane - Axis inclined to the V.P and parallel to the H.P – Axis inclined to the H.P and parallel to the V.P – Projections of solids with axes inclined to both the H.P and the V.P – Projections of spheres – Spheres in contact with each other – Unequal spheres.

UNIT IV: Sections of Solids

Projection of simple solids like prism, pyramid, cylinder and cone when the axis is inclined to one plane of projection –change of position & auxiliary projection methods- sectioning of above solids in simple vertical positions by cutting plane inclined to one reference plane and perpendicular to the other and above solids in inclined position with cutting planes parallel to one reference plane – true shapes of sections

UNIT V: Development of Solid Surfaces

Methods of Development – Development of Lateral surfaces of right solids- cube – Prisms- Cylinders – Pyramids – Methods of drawing the development of the lateral surface of a pyramid - Cone – Development of transition pieces – Spheres.

UNIT VI: Interpenetration of Solids

Line of Intersection – Methods of determining the line of intersection between surfaces of two interpenetrating solids – Line method – cutting –plane method – Intersection of two prisms – Intersection of cylinder and cylinder – Line method – Cutting-plane method- Intersection of cylinder and prism – Intersection of cone and cylinder – Cutting-plane method – Line-method – Intersection of cone and prism – Intersection of cone and cone – Intersection of sphere and cylinder or prism.

UNIT VII: Isometric Projections

Isometric axes, lines and planes – Isometric scale- Isometric drawing or isometric view- Illustrative problems – Isometric drawing of planes or plane figures- Method of points- Four-centre method- Isometric drawing of prisms and pyramids – Methods of drawing non-isometric lines- Box method – Offset methods – Isometric drawing of cylinders – Isometric of cones - Isometric of spheres- Typical Problems.

UNIT VIII: Terminology of Fasteners

Bolts – Hexagonal head bolt – Square headbolt – Cheese head bolt – T-head bolt – Hook Bolt – Eyebolt – Cup head bolt – Counter sunk head bolt – Headless taper bolt – Nuts – Hexagonal nut – Square nuts – Flanged nut – Knurled nut – Wing nut – Cap nut – dome nut – Capstan nut – Ring nut – Thumb nut – Screws – Chease head screw- Filister head screw- Counter sunk screw - Oval head screw- round head screw- Hexagonal head screw - Square head screw - Alien screw- Philips screw- Keys - Saddle key – Sunk key etc.

UNIT IX: Fits and Tolerances

Interchangeability – Shaft – Hole - Tolerance – Kinds of Tolerance – Allowance – Positive Allowances – Negative Allowances – Clearance Fit – Transition Fit – Interferences Fit – Symbols of I.S.I.

UNIT X: Joints

Welding – Welding joints – Welding Beads – Preparation of Job Edges -Rivetting – Cotters.

Reference books:

Elementary Engineering Drawing	- N.D Bhatt
Engineering Drawing	- Ghose. D.N.
A text Book of engineering Drawing	- K.V. Natarajan
A text Book of Engineering Drawing	- Gopalakrishnan
Engineering Graphics	- K.L. Narayanan & Kannaiah

AMD00 A02 – THEORY OF MACHINES

MAJOR DIVISIONS:

UNIT I	- Mechanisms
UNIT II	- Friction
UNIT III	- Belt Drives
UNIT IV	- Brakes and Dynamometers
UNIT V	- Lubrication
UNIT VI	- Gearing
UNIT VII	- Gyroscopic Couple
UNIT VIII	- Cams
UNIT IX	- Balancing
UNIT X	- Vibrations

UNIT I: Mechanisms

Definition – Machine and Structure – Kinematic link, pair and chain – classification of Kinematic pairs – Constraint & motion – Degrees of freedom slider crank – Single and double – Crank rocker mechanisms – Inversions – applications, Kinematic analysis and synthesis of simple mechanisms – Determination of velocity and acceleration of simple mechanisms.

UNIT II: Friction

Types of friction – friction in screw and nut – pivot and collar – thrust bearings – collar bearing – plate and disc clutches.

UNIT III: Belt Drives

Belt (flat & vee) and rope drives – creep in belts – Jockey pulley – open and crossed belt drives – Ratio of tensions – Effect of centrifugal and initial tensions – Effect of centrifugal and initial tension – condition for maximum power transmission.

UNIT IV: Brakes and Dynamometers

Materials for Brake Lining – Types of Brakes- Single Block or Shoe Brake – Pivoted Block or Shoe Brake – Double Block or Shoe Brake – Simple Band Brake – Differential Band Brake – Band and Block Brake – Internal Expanding Brake – Braking of Vehicle – Dynamometer – Types of Dynamometers – Classification of Absorption Dynamometers – Classification of Transmission Dynamometers – Epicyclic – train Dynamometers – Belt Transmission Dynamometer – Torsion Dynamometer – Bevis Gibson Flash Light Torsion Dynamometer.

UNIT V: Lubrication

Lubricant, Liquid lubricant, Semi solid lubricant, Solid lubricant – Properties of lubricant – Lubrication methods- lubricators- Coolant – Kinds of cutting fluids – Properties of cutting fluids – Metals, operations and proper cutting fluids.

UNIT VI: Gearing

Gear profile and geometry – nomenclature of spur & helical gears – laws of gearing – interference – requirement of minimum number of teeth in gears – gear trains – simple and compound gear trains – determination of speed and torque in epicyclic gear trains.

UNIT VII: Gyroscopic Couple

Precessional Angular Motion – Gyroscopic Couple – Effect of Gyroscopic Couple on an Aeroplane – Terms used in a Naval Ship – Effect of Gyroscopic Couple on a Naval Ship During Steering – Effect of Gyroscopic Couple on a Naval Ship During pitching – Effect of Gyroscopic Couple on a Naval Ship During Rolling – Stability of a Four Wheel Drive Moving in a curved path – Stability of a Two Wheel Vehicle Taking a Turn – Effect of Gyroscopic Couple on a Disc Fixed Rigidly at a Certain Angle to a Rotating Shaft.

UNIT VIII: Cams

Classification of Followers – Classification of Cams – Terms used in Radial cams – Motion of a Follower – Displacement, Velocity and Acceleration Diagrams – Displacement, Velocity and Acceleration Diagram when the Follower Moves with Simple Harmonic Motion – Cam design for different follower motions.

UNIT IX: Balancing

Static and dynamic balancing – single and several masses in different planes – primary and secondary balancing of reciprocating masses – balancing single and multi cylinder Engines – Governors and Gyroscopic effects.

UNIT X: Vibrations

Free, forced and damped vibrations of single degree of freedom systems – force transmitted to supports – vibration Isolation – vibration absorption – torsional vibration of shafts – single and multirotor systems – geared shafts – critical speed of shafts.

Reference books:

Theory of Machines - R.S. Khurmi & J.K. Gupta
Theory of Machines - P.L. Ballaney
Theory of Machines - Thomas Bevan
Theory of Machines - Abdullah Shariff

AMD00 A03 MATERIAL SCIENCE
MAJOR DIVISIONS:

UNIT I	- Mechanical Behaviour of Materials
UNIT II	- Chemical Bond
UNIT III	- Elementary Crystallography
UNIT IV	- Electron Theory of Solids
UNIT V	- Conducting Materials
UNIT VI	- Dielectric Materials
UNIT VII	- Magnetic Materials
UNIT VIII	- Superconducting Materials
UNIT IX	- Semiconducting Materials
UNIT X	- Modern Engineering Materials

UNIT I: Mechanical Behaviour of Materials

Materials Science – Properties of Engineering Materials – Selection of Materials for engineering Applications – Different mechanical properties of Engineering materials – Creep – Fracture – Technological properties – Factors affecting mechanical properties of a material – Heat treatment – Cold and hot working – Types of mechanical tests – Metal forming processes.

UNIT II: Chemical Bond

Review of Atomic Structure – interatomic Forces different types of Chemical Bonds – Ionic or electrovalent Bond – Covalent Bond – Metallic Bond – Dispersion Bond Dipole Bond – Hydrogen Bond – Binding Energy of a crystal – Elastic Properties.

UNIT III: Elementary Crystallography

Introduction – Some fundamental definitions in Crystallography – Nomenclature of Crystal Directions – Nomenclature of Crystal Planes: Miller Indices – Symmetry elements of a crystalline solid – Crystal structures of important Engineering materials – Other important structures – X-ray diffraction methods to determine crystal structure – Crystal imperfections – Point defects – Line defects – Surface defects – volume defects – effects of crystal imperfections.

UNIT IV: Electron Theory of Solids

Introduction – The classical free electron theory and the quantum free electron theory – Electron energies in metals and fermi energy – Density of states – anti symmetric nature of the wave functions of the fermi system – Explanation of covalent bonding in crystals – Electron in a periodic potential – Energy bands in solids – Brillouin zones – Distinction between metals, insulators and semiconductors – Effective mass of electron and concept of hole – the hall effect – Specific heat theories of solids.

UNIT V: Conducting Materials

Introduction – Atomic interpretation of Ohm's law – Relaxation time and electrical conductivity – Relaxation time, collision time and mean free path – The heat developed in a current carrying conductor – Sources of resistivity of metals and alloys – Thermal conductivity – Wiedemann – franz law – thermal expansion.

UNIT VI: Dielectric Materials

Introduction – Fundamental definitions in dielectrics – Different types of electric polarization – Frequency and temperature effects on polarization – Dielectric loss – Local field or internal field – Clausius.

UNIT VII: Magentic Materials

Introduction – Different types of magnetic materials – Classical theory of diamagnetism (Langevin theory) – Langevin theory of Paramagnetism – Weiss theory of Paramagnetism – Weiss theory of ferromagnetism (Molecular field theory on ferromagnetism).

UNIT VIII: Superconducting Materials

Introduction – Explanations for the occurrence of superconductivity – General properties of super-conductors – Types of superconductors – Applications of super conductors.

UNIT IX: Semiconducting Materials

Introduction – Chemical bonds in semiconductors like Germanium and Silicon – Intrinsic and extrinsic semiconductors – Carrier concentration in intrinsic semiconductor – Carrier concentration in N type semiconductors – Carrier concentration in P type semiconductors – Variation of carrier concentration with temperature in N type semiconductor – Conductivity of extrinsic semiconductor – P-N junction theory and transistor as an amplifier.

UNIT X: Modern Engineering Materials

Introduction – Polymers – Ceramics – Super strong materials – Cermets – High temperature materials – Thermoelectric materials – Electrets – Nuclear Engineering materials.

Reference books:

1. Materials Science - Khurmi
2. Engineering Materials - Hagra Chowdry

AMD00 A04 APPLIED MECHANICS AND STRENGTH OF MATERIALS

MAJOR DIVISIONS:

UNIT I	- Composition and Resolution of Forces
UNIT II	- Moments and their Applications
UNIT III	- Equilbrium of Forces
UNIT IV	- Moment of Inertia and Friction
UNIT V	- Principles of Lifting Machines
UNIT VI	- Motion, Work, Power and Energy
UNIT VII	- Simple, Stresses and Strains
UNIT VIII	- Bending Moment and Shear Force
UNIT IX	- Deflections of Beams
UNIT X	- Torsion of Circular Shafts

UNIT I: Composition and Resolution of Forces

Effects of a force – Characteristics of a Force – Principle of Physical independence of forces – Principles of Transmissibility of forces – System of Forces – Resultant forces– Parallelogram law of forces – Resolution of Force – Principle of Resolution – Method of Resolution for the Resultant force – General laws for the Resultant force – Graphical (Vector) method for the Resultant force.

UNIT II: Moments and their Applications

Introduction – Moment of a force – Graphical Representation of Moment – Varignon's Principle of moments (Law of Moments) – Applications of Moments – Position of the Resultant force by Moments – Levers – Types of Levers – Simple Levers – Compound Levers – Parallel Forces and Couples – Classification of Parallel Forces –Moment of a Couple – Classification of Couples – Clockwise Couple – Anti-clockwise Couple – Characteristic of a Couple.

UNIT III: Equilibrium of Forces

Introduction – Principles of Equilibrium – methods for the Equilibrium of Coplanar Forces – Analytical method for the Equilibrium of Coplanar forces – Lami's Theorem – Graphical method for the Equilibrium of coplanar forces – Centre of Gravity – Centroid – Methods for Centre of Gravity of simple figures – Centre of gravity by moments and plane figures – Axis of Reference – Centre of Gravity of Symmetrical sections – Centre of Gravity of unsymmetrical sections – Centre of Gravity of solid bodies – Centre of Gravity of Sections with cut out holes.

UNIT IV: Moment of Inertia and Friction

Introduction – Moment of Inertia of a Plane Area – Methods for findings out Moment of Inertia – Theorem of Perpendicular Axis – Moment of Inertia of a circular section – Theorem of Parallel axis – Moment of inertia of a composite section – Static Friction – dynamic Friction – Limiting Friction – Normal reaction – Angle of Friction – Coefficient of Friction – Laws of Friction – Laws of Static Friction – Laws of kinetics or dynamic Friction – Equilibrium conditions on planes.

UNIT V: Principles of Lifting Machines

Introduction – Simple Machine – Compound Machine – Lifting machine – Types - Mechanical merits – Input of a Machine – Output of a machine – Efficiency of a Machine –Reversibility of a machine – Condition for the Reversibility of a Machine – Self – locking machine – friction in a machine – maximum mechanical advantage of a lifting machine – maximum efficiency of a lifting

machine – Single purchase Crab winch – Double Purchase Crab Winch – Simple pulley – First systems of Pulleys – Second systems of Pulleys – third system of pulleys – Simple screw jack – Differential Screw Jack - Worm Geared screw jack.

UNIT VI: Motion, Work, Power and Energy

Introduction – Important Terms – Rigid Body – Newton's laws of Motion – Motion on inclined plane – Unit of work – Graphical Representation of Work – Power – Units of power types of Engine powers – Indicated Power – Brake power – Efficiency of an Engine – Motion on inclined plane – Energy – Units of Energy – Mechanical Energy – Potential energy – Kinetics energy.

UNIT VII: Simple Stresses and Strains

Introduction – Types of Stresses – Tensile Stress – Compressive stress – Elastic limit – Hooke's Law – Modulus of Elasticity (or Young's Modulus) – Stress-strain diagram for Tension – Deformation – Simple Statically indeterminate Problems – Thermal Stresses and Strains – Poisson's Ratio – Volumetric strain – Bulk Modulus – Relation between bulk modulus and Young's modulus – Shear stress – Principles of Shear stress – Shear Modulus or Modulus of Rigidity – relation between modulus of elasticity and modulus of rigidity.

UNIT VIII: Bending Moment and Shear Force

Introduction – Types of loading – Shear force – bending moment – Sign Conventions – Shear force and bending moment diagrams – Relations between loading, Shear force and bending Moment – Cantilever beam – Simple supported – overhanging beam – Point of contraflexure – Bending Stresses in Beams – Distribution of Shearing stress – Distribution of shearing stress over a Rectangular section – Distribution of shearing stress over a circular section – Distribution of shearing stress over an I – section – Distribution of shear stress over a T-section – Distribution of shearing stress over a Miscellaneous section.

UNIT IX: Deflections of Beams

Introduction – Curvature of the bending beam – Relation between Slope, Deflection and radius of curvature – methods for Slope and Deflection at a Section – Double integration method for slope and Deflection – simply supported beam – Moment Area method for slope and Deflection – Mohr's theorems – Deflection of Cantilevers – Methods for slope and Deflection at a Section – Double integration method for slope and deflection – Moment Area method for Slope and Deflection.

UNIT X: Torsion of Circular Shafts

Introduction – Assumptions for shear stress in a Circular Shaft subjected to Torsion – Torsional Stresses and strains – Strength of a Solid Shaft – Power transmitted by a shaft – Polar Moment of Inertia – Replacing a Shaft – Thin Cylindrical and Spherical Shells – Failure of a Cylindrical shell due to an internal Pressure – Stresses in a Thin cylindrical shell – Circumferential stress – Longitudinal stress – Design of thin Cylindrical shells – change in Dimensions of a Thin Cylindrical shell due to an internal Pressure – Change in volume of a Thin Cylindrical shell due to an internal pressure – Thin spherical shells – Change in Diameter and Volume of a thin spherical shell due an internal pressure.

Reference books:

Applied Mechanics & Strength of materials : R.S. Khurmi
Applied Mechanics for Engineers : Duncan .J
Strength of Materials : Khurmi .R.S

AMD00 A05 THERMAL ENGINEERING

MAJOR DIVISIONS:

UNIT I	- Thermodynamics
UNIT II	- Forms of Energy
UNIT III	- Thermodynamic process
UNIT IV	- Air Cycles
UNIT V	- Gas Turbines
UNIT VI	- Air Compressors
UNIT VII	- Types of Refrigerators
UNIT VIII	- Psychrometry
UNIT IX	- Air – Conditioning
UNIT X	- Calorific value of fuels

UNIT I: Thermodynamics

Definition – Fundamentals of force, pressure, work, power, energy, volume, temperature, heat, specific heat – units – specific heats of a gas – absolute temperature – Gauge pressure, atmospheric pressure and absolute pressure – N.T.P. and S.T.P conditions – problems – Thermodynamic system – open, closed and isolated systems – Equilibrium of a system – Laws of thermodynamics – Zeroth law, First law and second law of thermodynamics – Kelvin, Plank and Clausius statements of second law.

UNIT II: Energy

Various forms – Potential, Kinetic, Internal, External energies – flow energy – Enthalpy of a gas – Laws of perfect gases – Vapour and gas phase – Boyle's law – Charles law – Joule's law, Regular law – Avagadro's law – characteristic equation of a gas – universal gas constant – Molar specific heats of a gas – External work done, change in internal energy – Regulation between the two specific heats of a gas – problems.

UNIT III: Thermodynamics Process

Thermodynamic process – definition – Entropy – pressure – volume (p-v) and temperature – Entropy (T-S) diagrams – various thermodynamic processes – constant volume, constant pressure, Isothermal, Adiabatic, Polytropic processes - Throttling process, Free expansion – General equation for change in entropy of a gas. Change in internal energy, Heat transferred, change in enthalpy, and relation between pressure – volume-temperature for the above processes p-v and T-s diagrams for various processes – problems.

UNIT IV: Air Cycles

Thermodynamic cycles – Air standard efficiency of a cycle – Assumptions made reversible and irreversible cycles carnot cycle – Effect of thermodynamic reversibility on efficiency – conditions of reversibility – Otto cycle, Diesel cycle – Derivation of air standard efficiency comparison – between otto and Diesel cycles – Hypothetical (Ideal) and actual p-v diagrams – comparison – Effect of compression ratio and cut-off ratio on efficiency – Actual Thermal efficiency and relative efficiency – problems – dual combustion cycle – Description only.

UNIT V: Gas Turbines

Classification – open cycle and closed cycle – Brayton cycle gas turbines – working principle – Jet populsion – turbojet, turbo-exchanger, preheater, reheating, intercooling – Advantages and uses of gas turbines – comparison of gas turbines with I.C. engines – No problems.

UNIT VI: Air Compressors

Compressed air – classification of air compressors – working principle of single and multistage compressors – volume and mass of compressed air – power requirements for different modes of compression – intercooling – Advantages of multistage compression with intercooling – Perfect intercooling – condition for minimum work on maximum efficiency of compression in a multistage compressor – volumetric efficiency of a compressor – effect of clearance on volumetric efficiency – Problems on work done and power requirements with out the effect of clearance volume only.

UNIT – VII: Types of Refrigerators

Applications of refrigeration – C.O.P of a refrigerator – Unit of refrigeration – tonne of refrigeration – Actual C.O.P. and Relative C.O.P – Reversed Carnot cycle for refrigerator and Heat pump – Bell Coleman cycle – Principle of working of vapour compression and vapour absorption refrigerators – Simple problems on refrigeration - C.O.P – Refrigerating Effect and Power without using T-S Chart.

UNIT – VIII: Psychrometry

Dew point temperature – Humidity, specific humidity – Relative humidity – Psychrometric processes – Humidification and dehumidification – sensible heating and sensible cooling – use of psychrometric chart.

UNIT – IX: Calorific value of fuels

Higher (gross) calorific value – Lower (Net) calorific value – Determination of calorific value of duels of Bomb calorimeter – Gas calorimeter – Analysis of Exhaust and Fuel Gases by Orsat Apparatus – Effect of exhausts and fuel gases on atmospheric pollution and its control – Description only.

Reference books:

Engineering Thermodynamics - R.S. Khurmi
Thermal Engineering - Khurmi R.S & Gupta J.K
Thermodynamics Applied to Heat Engines - E,H. Lewit & Pitman
Engineering Thermodynamics - R. Prakash & G.P. Gupta
Applied Thermodynamic - W. Robinson
Thermal Engineering - Kodhandaraman, Domkundwar

AMD00A06 MODERN WORKSHOP

Major Divisions:

UNIT I	- Shop Hand Tools
UNIT II	- Shop Equipment and Power Tools
UNIT III	- Fitting Shop
UNIT IV	- Machine Shop
UNIT V	- Welding
UNIT VI	- Fasteners
UNIT VII	- Machines
UNIT VIII	- Spray Painting
UNIT IX	- Automotive Service Business
UNIT X	- Safety in the Shop

UNIT I: Shop Hand Tools

Description of Hand Tools and power Tools – Screwdrivers – Hammers – Wrenches – Open – end Wrenches – Box wrench – Combination Wrench – Socket Wrenches – Torque Wrenches – Adjustable Wrench – Pliers – Removing broken studs – Pullers – Cutting Tools – Chisels – Hacksaw – Files – Drill Bits – Taps and Dies – Apprentice's Toolbox

UNIT II: Shop Equipment and Power Tools

Types of power tools - bench vise – Electric Drill – Grinding wheels – Vacuum cleaner – cautions to observe when using pneumatic tools – Air-chisel – Air impact wrenches – Air Drill – Air Ratchet – Pneumatic floor jack – Care of Air Tools – Car lifts – Hydraulic Floor Jack – Portable Crane – Hydraulic Press – Parts Cleaners – Hot Tanks – Steam Cleaner – Glass-Bead cleaners – Other shop Equipment.

UNIT III: Fitting Shop

Procedure – Fitting tools instruments – Marking table – Surface plate – Angle plate – odd leg or jenny caliper – divider – scriber – Surface gauge – Universal surface gauge – Trammel – V. Block – punch – Chisel – File – scraper – Hacksaw – Drill – Tap – Die – Rcamer – Stud extractor – Gauges – Plug Gauge – Ring Gauge – snap Gauge – Radius Gauge – Profile Gauge – Centre Gauge – Receiving Gauge – Caliper Gauge – Drill Gauge – Drill point Gauge – Feeler Gauge – Screw Pitch Gauge – Angle Gauge – Taper Gauge – Wire Gauge – Gauge Block – Indicator Gauge – Sin bar - filling – scraping

UNIT IV: Machine Shop

Different types of conventional machine tools – specialized machines for Automobile such as cylinder boring machine – connecting rod boring machine-valve refacer – valves seat grinder – Crankshaft grinder etc – different machining processes – tools and tool angles speeds and feeds – Shaping Machine – Description of Standard Shaper – Quick Return Mechanism –Operation Performed – Planer – Types – Standard Double Housing Planar - Operations performed – Milling Machine – Types – Plain or Horizontal, Vertical and Universal Milling – Machines – Milling Cutters – Milling Operations – CAD/CAM/CIM – Components of CIM- CADD-Manufacturing Planning NC Machines – CNC Machines – DNC-CAM-FMS-Robotics – Automated Material Handling – CIM - Implementation and future.

UNIT V: Welding

Different types of welding – oxy-acetylene welding – arc welding – Automobile hydrogen – Thermit and resistance welding of C.I – Aluminum and stainless steel welding machines – Tin smithy and sheet metal work – marking – cutting – bending – soldering etc – tools.

UNIT VI: Fasteners

Types of fasteners – Integral fasteners – Discrete fasteners – Keys – Cotter – Foundation Bolts – Riveting – Quick operating fasteners – Shrink fittings.

UNIT VII: Machines

Lathe – Description of centre Lathe – Work holing Devices – Operation Performed - Lathe tools – speed – Feed-tool angle – Types of operations – slotting – specification – tools – operations drilling and drilling machine – Description of Sensitive, Upright and Radial Drilling Machine – Operations Performed – Twist Drill.

UNIT VIII: Spray Painting

Choice of Painting - Composition paints – Types of paint – Ingredients of paints – Paint System – Pretreatment of the surface (Surface preparation) – Degreasing metal surfaces before painting – Preparation of iron and steel for painting – Pretratment of iron and steel – primers – applying paint – Drying of paint (paint stoving methods) – Various Possible paint system for different materials – Paint manufacture – Testing paints and paint systems – Varnishes.

UNIT IX: Automotive Service Business

Description of Automotive Service – Getting ready for a job in Automotive Service – the Automotive Industry – Opportunities in the Automotive –service Business – The Service Station – Automotive Dealers – Independent garages – Specialty shops – Fleet Garages – Parts dealer – Department Accessory and Automotive – supply stores

UNIT X: Safety in the Shop

Description of Shopwork and Safety – Safety is your job – shop layouts – Shop Hazards to watch out for – hazards due to faulty working habits or conditions – hazards due to Equipment defects or misuse – Hand –tool Hazards to watch out for – Fire prevention – Fire Extinguishers – the safety rules – Using power-driven Equipment – Emergency operations – Driving cars in the shops – Tow-truck operation – Description of the six steps in Automotive Service – Specifications – Manufacturers – service Manuals – Flar Rate – Other useful Publications – Paperwork.

Reference books:

Production Technology	- Hagra Chowdry
Elements of Workshop Technology	- Chandri
Automotive Mechanics	- Crouse & Anglin

SECTION – B

AMD00 B01 – AUTO ENGINES

MAJOR DIVISIONS:

UNIT I	- Engine Operation
UNIT II	- Engine Construction
UNIT III	- Valves and Valve Trains
UNIT IV	- Engine Performance
UNIT V	- Automotive Engine Fuels
UNIT VI	- Gasoline Fuel – Injection Systems
UNITVII	- Engine Lubricating System
UNIT VIII	- Engine Cooling Systems
UNIT IX	- Automotive Emission Control Systems
UNIT X	- Engine Testing Instruments and Tuneup

UNIT I: Engine Operation

Introduction – Engine classification – Description of Internal – Combustion Engines – Engine construction – Pistons and piston rings – Engine operation – Intake stroke – Compression stroke – Power stroke – Exhaust stroke – Flywheel and Drive plate – Diesel engines – Compression of 2 stroke & 4 stroke engine

UNIT II: Engine Construction

Description of the Engine – Cylinder block – Oil pan, Aluminium cylinder block – Sleeveless Aluminium cylinder blocks – Air-cooled Engines – Cylinder Head – Swirl-type combustion chamber – Precombustion chamber – Diesel – Engine cylinder Head – Exhaust Manifold – Intake manifold – Crankshaft – vibration Damper – Engine Bearings – Bearing requirements – Engine Mounts – Connection rod – Pistons and Piston rings, Expansion control in pistons

UNIT III: Valves and Valve Trains

Description of types of Valve trains – Types of valve arrangements – Free type valve rotator – Positive Valve Rotator – Valve lifters – Roller Tappets – Hydraulic Valve Lifters – Valve Timing – Recondition of cylinder head.

UNIT IV: Engine Performance

Description of Work – Energy – Power – Torque – Horsepower inertia – Friction – Bore and Stroke – Piston Displacement – Compression Ratio – Increasing compression ratio – Volumetric Efficiency – Brake Horsepower – Indicated horse – power – Friction Horsepower – Relating BHP,IHP and FHP – Engine Torque – Brake Horsepower versus Torque – Engine Efficiency – overall Efficiency

UNIT V: Automotive Engine Fuels

Description of Automotive Engine fuels Gasoline – Antiknock Value – Increasing the octance rating – Two kinds of Gasoline – Methyl Alcohol – Liquefied Petroleum gas – Diesel-Engine fuel – Cetane number – Need for clean Diesel fuel – Types of Carburetor – fuel-system components – Fuel Tank – Fuel filters and screens – Fuel Gauges – Fuel pumps – Electric Fuel pumps – Air Cleaners – Exhaust system – Muffler – Superchargers and Turbochargers.

UNIT VI: Gasoline Fuel-injection Systems

Operation and Service – Description of fuel injection – Timed and continuous injection – Advantages of port fuel-injection – Electronic fuel injection – Digital fuel injection – continuous injection system – digital electronic fuel injection - Diesel fuel-injection systems – Operation and Service – Description of Diesel Engines – Diesel fuel-system requirements – Cam operated in-line plunger pump – Rotary-Distributor pump controls – Governors for fuel-injection pumps – Injection Nozzle – Glow plugs – Starting Instructions – Other starting instructions – Coolant and fuel heaters – Vacuum pump – Diesel-Engine Fuel system – Diesel fuel-system trouble diagnosis.

UNIT VII: Engine Lubricating System

Operation and Service – Purpose of Lubricating oil – Properties of lubricating oil – Sludge Formation – Lubricating system trouble diagnosis – Oil Consumption – Oil-pump service – Relief-valve service – Servicing oil-pressure indicators

UNIT VIII: Engine Cooling Systems

Description of purpose of the cooling system – Air-cooled Engines – Liquid-cooled engines – Water jackets – Water pumps – Engine Fan – Variable – Speed Fan – Drive belts, Electric fans – Radiator – Expansion Tanks – Transmission oil coolers – thermostat Radiator pressure cap – Antifreeze solution – Temperature Indicators – Cooling – System Service – Description of working safety on the cooling system – Cooling system trouble diagnosis – Testing Anti-freeze – Radiator leaks – Water-pump cooling system service method.

UNIT IX: Automotive Emission Control Systems

Description of Atmospheric pollution and the Automobile Positive crankcase ventilation system – Fuel-vapor return line – Exhaust Emissions – Cleaning the Exhaust gas – Controlling the Air-fuel mixture – Exhaust-Gas Recirculation (EGR) Valve overlap – Electronic Spark advance – Electronic Engine control systems – Treating the Exhaust gas – Air – injection system – Air – Aspirator system – Catalytic Converters – duel-bed and Three way catalytic Converters.

UNIT X: Engine – Testing Instruments and Tune-up

Description of Engine – Testing procedures – Engine-testing instruments – Tachometer – Cylinder Compression Tester – Cylinder Leakage Tester – Engine Vacuum Gauge – Exhaust –Gas Analyzer – Ignition Timing Light – Oscilloscope – Dynamometer – Engine Analyzers – Tuneup Procedure – Tuneup and car care and diagnosis chart – Engine Service – Engine reconditioning procedures – Cylinder block – Cylinder head – Valve mechanism – Crank shaft – Connecting rod – Piston – Liners – Lubrication system – Cooling system etc.

Reference books:

Automobile Engineering	- W.H. Crouse
Automotive Mechanics	- H. Crouse & Anglin
Mechanics of Car	- A.W. Judge
Automobile Engineering	- C.P Nakra
Automobile Engineering	- Vol I & II by Dr. kripal Singh
Automotive Mechanics Principles & Practices	- Joseph Heitner

AMD00 –B02 AUTOMOBILE CHASSIS AND TRANSMISSION

MAJOR DIVISIONS:

UNIT I	- Chassis constructions
UNIT II	- Clutches
UNIT III	- Transmissions
UNIT IV	- The drive line
UNIT V	- Suspension systems
UNIT VI	- Front Axle and Steering
UNIT VII	- Wheels and Tyres
UNIT VIII	- Brakes – I
UNIT IX	- Brakes – II
UNIT X	- Body and Safety consideration

UNIT I: Chassis Construction

Classification – Conventional construction – subframes – Defects in frame – Frameless construction.

UNIT II: Clutches

Requirements of clutch – Types of clutches – Principle of friction clutches – dry friction clutches – clutch operation – wet clutch – clutch components clutch plate – clutch facing – Other clutch components – preliminary inspection of clutch – clutch adjustment – clutch overhaul – clutch refacing – clutch trouble shooting fluid flywheel – Fluid flywheel trouble shooting

UNIT III: Transmission

Introduction – Functions of transmission – Necessity of Transmission – Types of Transmission – Manual Transmission – Sliding mesh gear box – Constant mesh gear box – Synchromesh gear box – Selector mechanism – Lubrication of gear box – transfer box – gear box trouble shooting – Automatic transmission – Epicyclic gear box – freewheel unit – Torque converter – Principle of automatic transmission.

UNIT IV: The Drive Line

Propeller shaft – Universal joint – Analysis of Hook's joint - Propeller shaft overhaul – Propeller shaft trouble shooting – Final drive – Differential – Rear axle shaft supporting – Rear axle casting – Rear axle trouble shooting – Improvements in four wheel drive

UNIT V: Suspension System

Introduction – Objects of suspension – Basic requirements – Function suspension springs – Types of suspension springs – Leaf springs – Coil springs – Torsion Bars – Rubber springs – Plastic suspension – Shock absorbers – Independent suspension – Stabilizer or Anti roll device – Interconnected suspension system – Air suspension – Hydrolastic suspension – Diamler Benz vehicle suspension – Hydragas interconnected suspension system – suspension system trouble shooting.

UNIT VI: Front Axle and Steering

Introduction – Front Axle – wheel alignment – Factors of wheel alignment – Factors pertaining to wheels – Steering geometry – Correct steering angle – Steering mechanism – Cornering force – Self – righting torque – Under steer – oversteer – steering linkages – Steering gears – Steering ratio – Reversibility – Special steering columns – Power columns – Power steering – Advanced steering systems – Steering adjustments – Checking of wheel alignment and steering geometry – Steering trouble shooting.

UNIT VII: Wheels and Tyres

Types of wheels – Wheel dimensions tyre – Desirable tyre properties – Types of tyres – Carcass types – Comparison of radial and bias – ply tyres – Tyre materials – Consideration in tread design – Tyre section – Tyre designation – Factors affecting tyre life – Tyre manufacture – Precautions regarding the tyres – Wheel and tyre trouble shooting.

UNIT VIII: Brakes – I

Principle – Braking requirements – Brake efficiency and stopping distances – Fading of brakes – Weight transfer – Wheel skidding – types of brakes – Drum brakes – Disc brakes – Mechanical brakes – Girling mechanical brakes – Hydraulic brakes – Bleeding of brakes – Brake fluid – Brake system of Maruti(Suzuki) 800 car.

UNIT IX: Brakes – II

Electrical brakes – Servo brake systems – Vacuum servo brakes – bendix Hydromax brakes – Engine exhaust brakes – Air brakes – Hand brake – Hill holding device – brake drums – brake shoes – Brake linings – Inspection of brake systems – Adjustment of brakes – Replacing break lining – Brake maintenance – Braking system trouble shooting – References.

UNIT X: Body and Safety considerations

Requirements of automobile body – Constructional details – Materials for body works – Rust protection – Safety considerations.

Reference books:

Automobile Engineering	- W.H. Crouse
Automotive mechanics	- H. Crouse and Anglin
Mechanics of Car	- A.W. Judge
Automobile Engineering	- C.P. Nakra
Automobile Engineering	- Dr. Kripal Singh (Vol. I)

AMD00 – B03 AUTOMOBILE ELECTRICAL SYSTEM AND AUTO INSTRUMENTS

MAJOR DIVISIONS:

UNIT I	- Automotive Electrical System
UNIT II	- Automotive Battery
UNIT III	- Charging System
UNIT IV	- Ignition System
UNIT V	- Electronic Ignition Systems
UNIT VI	- Electronic Ignition system Service
UNIT VII	- Head Lights
UNIT VIII	- Accessory Systems
UNIT IX	- Ventilation, Heating and Air – conditioning System
UNIT X	- Heater and Air – conditioner Service

UNIT I: Automotive Electrical System

Description of the Automotive Electrical system – Measuring Electricity – Magnetism – the Ammeter – Making Electrons move – Voltage – Insulation – Magnets – Electromagnets – Resistance – Ohm's law – One-wire systems – Alternating and direct current – Wiring circuits – Printed circuits – Fuses – Circuit breakers – Fusible links – Electronics.

UNIT II: Automotive Battery

Battery maintenance – Test conducted on Battery – Charging method - Starting system – Operation – Construction – Service of starter motor – Overrunning clutch – starter motor controls – starting system troubles.

UNIT III: The Charging system

Operation and Service – Generator – alternator – Functions – Construction details – Cut-out Regulators – alternator & generator – components testing methods.

UNIT IV: Ignition System

Operation and Service – Description and purpose of ignition system – Centrifugal advance – Vacuum advance – Combined centrifugal and vacuum advance – Emission control of vacuum advance - Ignition switch – Causes of ignition failure – ignition timings – Diagnostic timing computer – Spark-plug service – Ignition wiring – Contact point service – Distributor service

UNIT V: Electronic Ignition Systems

Type of Magneto ignition system – Rotating coil – Magneto ignition system – Type of Electronic ignition system – Advantage – Contact and contact less ignition system

UNIT VI: Electronic Ignition System Service

Description of Electronic Ignition – system service – Possible causes of Electronic ignition system failure – Electronic ignition – system trouble diagnosis chart – Servicing Electronic Ignition systems – oscilloscope patterns – Service tips for Electronic Ignition systems – Checking Electronic spark-timing systems.

UNIT VII: Head lights

Description of Headlights – Headlight Aiming – Automatic Headlamp dimmer – Headlamps –on-warning buzzer- headlamps Replacement – Headlight switch – Brake light switch.

UNIT VIII: Accessory Systems

Directional signals – backup lights – Emergency of Hazard flasher – Courtesy lights – Fiber-optic monitor systems – Horns and Horns relays – Indicating devices - Speedometer and Odometer – Windshield wiper – Antilock Braking system – Speed (Cruise) control system – Seat Adjuster – Window Regulators – Power Door locks.

UNIT IX: Ventilation, Heating, and Air-Conditioning Systems

Description of Ventilating the passenger Compartment – Power Ventilating system – Heater – Air-Conditioner Fundamentals – Restricting Refrigerant flow – Orifice and thermostatic Expansion valve – Anti-icing controls – Electric pressure switch – Thermostatic cycling switch – Cycling and Non cycling compressors – Compressor clutch – Types of compressors – Sight glass – Receivers and Accumulators – Safety Devices – Refrigerant – Refrigerant Oil – Manually controlled and Automatic systems – Manual control – Automatic control.

UNIT X: Heater and Air – Conditioner Service

Description of Heating – system trouble Diagnosis – Testing the vacuum – control system-Replacing Heater-system components – Enemies of the Air-Conditioner – Air – conditioner Heater troubles – Basic Air – conditioner service procedures – Using the gauge set – Recharging the system – Replacing Hose – Removing and installing other components.

Reference books:

Automobile Engineering	- W.H. Crouse
Automotive mechanics	- H. Crouse and Anglin
Mechanics of Car	- A.W. Judge
Automobile Engineering	- C.P. Nakra
Automobile Engineering	- Dr. Kripal Singh (Vol. II)

AMD00 – B04 AUTOMOBILE DESIGN AND DRAWING

MAJOR DIVISIONS:

UNIT I	- Introduction
UNIT II	- Limits, Fits, Tolerances, Surface Finish, Shafts and Springs
UNIT III	- Design of Cylinder and Piston
UNIT IV	- Design of Connecting Rod, Crankshaft
UNIT V	- Levers
UNIT VI	- Design of Valves and Flywheel
UNIT VII	- Brakes
UNIT VIII	- Vibration and Vibration Controls
UNIT IX	- Automobile Components Drawing
UNIT X	- Engine Components and Valves

UNIT I: Introduction

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

UNIT II: Limits, Fits, Tolerances, Surface Finish, Shafts and Springs

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

UNIT III: Design of Cylinder and Piston

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

UNIT IV: Design of Connecting Rod, Crankshaft

Material for connecting rod, determining minimum length of connecting rod, small end and big end design, shank design, design of big end cap bolts, connecting rod failures, balancing of I.C. Engines, significance of firing order, material for crankshaft, design of crankshaft under bending and twisting, balancing weight calculations.

UNIT V: Levers

Application of levers in engineering practice – Design of lever – Hand levers – Foot levers – Cranked lever – lever of a lever safety value – Bell Crank Lever- Rocker Ram for Exhaust value – Miscellaneous levers.

UNIT VI: Design of Valves and Flywheel

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

UNIT VII: Brakes

Energy absorbed by a brake – Heat to be dissipated during braking – Material for brake lining – Types of brakes – Single block or Shoe brake – Pivoted block or shoe brake – Double block or Shoe brake – Simple band brake – Differential band brake – Band and block brake – Internal expanding brake.

UNIT VIII: Vibration and Vibration Controls

Load or Force – Stress – Strain –relationship – Poisson's ratio - bulk modulus – Factor of Safety – impact stress – Stress in composite bar – Analysis of torsion shear stress – bending stress analysis – Stresses in Eccentric loading – State of stress in two dimensions – theories of failures – analysis of fatigue stresses – Creep stress analysis.

UNIT IX: Automobile Components Drawing

Coupling - Split muff coupling - Universal coupling - Flexible bushed pin type- Bearing Types of bearings -Plumber block -Foot step bearing.

UNIT X: Engine Components and Valves

Piston and connecting rod assembly - Valves - Classification of valves -Valve seats -Steam stop valve - Feed check valve.

Reference books:

R.K. Jain, Machine Design, Khanna Publishers, New Delhi, 1997.
Design Data Book, PSG College of Technology, Coimbatore, 2000.
Machine Drawing, R.B.Gupt.
P.M.Heldt, High Speed Combustion Engines, Oxford-IBH Publishing Co., Calcutta, 1965.
A.Kolchin and V.Demidov, Design of Automotive Engines, MIR Publishers, Moscow, 1984.
Sundararaja Murthy T.V, Machine Design, Khanna Publishers, New Delhi, 1991.

AMD00 – B05 INDUSTRIAL ORGANIZATION OF BUSINESS MANAGEMENT

MAJOR DIVISIONS:

UNIT I	- Industrial Engineering and Management Science
UNIT II	- Organization
UNIT III	- Plant Layout and Maintenance
UNIT IV	- Production Planning and Operations Management
UNIT V	- Inspection and Quality Control
UNIT VI	- Management Concept and Organization
UNIT VII	- Personnel Management and Industrial Relations
UNIT VIII	- Materials Purchase and Stores Management
UNIT IX	- Financial Management
UNIT X	- Marketing Management and Entrepreneurship

UNIT I: Industrial Engineering And Management Science

Concept of Industrial Engineering – History and Development of Industrial Engineering – Roles of Industrial Engineer – Applications of Industrial Engineering – Production Function – Input Output Model – Productivity – measures.

UNIT II: Organization

Concept of Organization – Characteristics – Organization theory: classical Theory, Modern Theory – Organizational Structure – Design of Organization Structure – Organization Chart – Departmentation – Authority – Span of Control – Group Dyanmics – Organizational Conflict.

UNIT III: Plant Layout And Maintenance

Concept – Locational economics – Rural V/S urban Plant Sites – Plant Layout – Process Layout – product Layout – Combination Layout – Fixed Position Layout – Flow Pattern – Work Station Design – Factory Buildings – Heuristic and other methods of line Balancing, Plant maintenance objectives – Duties, Functions and responsibilities – Types of maintenance – Plant maintenance schedule – Recent developments.

UNIT IV: Production, Planning And Operations Management

Production Planning and control concepts – Technological Forecasting – Economic batch quantity – Scheduling and Control of Production – Operations Management concepts – Linear programming – Graphical Method – Transportation Problem – Vogel's method and N.W. Corner method – Degeneracy – Fundamentals of simplex Procedure – Waiting line theory – Goal programming – Sensitivity Analysis – Dynamic Programming.

UNIT V: Inspection And Quality Control

Definition and Concept – Purposes or Objectives of Inspection – Kinds of Inspection – Statistical Quality control – Probability Concept – The Poisson distribution – Confidence limits – Measures of central Tendency – Analysis of Variance – Sampling Inspection – Control charts – Reliability – Monte-Carlo simulation – the Zero Defect concept – Quality circle.

UNIT VI: Management Concept And Organization

Management – Administration – Organization – Objectives – Evolution principles of Management –Contributions of F.W. Taylor – Scienctific management – Contributions of Henri Fayol – Elton Mayo – Gilbreth – Gantt – Functions of Management – Types of Ownership.

UNIT VII: Personnel Management And Industrial Relations

Definition and Concept – Recruitment and Selection of Employees – Training – Job Description – Duties and Responsibilities – Leadership styles Qualities – Safety Engineering – Accidents – Good-Housekeeping – Trade Unions – Industrial Disputes – Grievance Procedure – Workers participation in Management – Union – Management Relations – Principles of Labour legislation – Types of Labour laws, the Factories Act.

UNIT VIII: Materials, Purchase And Stores Management

Materials Management – Inventory control models –ABC Analysis – Material Requirements planning – Manufacturing Resource Planning – Operating cycle. Function and Principles of Material Handling – Engineering and Economic factors – Selection of material handling Equipment – maintenance of material handling equipment – types of material handling Equipments – Concept of Containerization and Palletization.

UNIT IX: Financial Management

Concept and Definition – Purpose of Investment – Financial Accounting – Assets – Liabilities – the journal and the Ledger – Trial Balance – Trading Account – Financial Ratios – Sources of Finance – Capital – Working capital – Factors affecting requirements for working Capital – Return on Investment – International Financial Management – Cost accounting and control concepts – Accounting of material, Labour and overhead – depreciation – Breakdown Analysis – Breakeven Chart – Budget.

UNIT X: Marketing Management And Entrepreneurship

Introduction – Marketing Concept – Principle and Functions – Marketing Research – Sales Forecasting – The Marketing Mix – Advertising – Sales Promotion – Channels of Distribution – Product packaging – Pricing – International Marketing – Role and Scope of small scale Industries – How to start a small scale industry – Registration of small scale Industries – Financial Assistance – Special Incentives – Entrepreneurship – concepts – Qualities of an Entrepreneur – Failure – Entrepreneurial Development – Export Promotion.

Reference books:

Industrial Engineering and Management - Dr. O.P. Khanna
Principles of Management - Koontz

AMD00 – E01 TRANSPORT MANAGEMENT
MAJOR DIVISIONS:

UNIT I	- Organizational Structure
UNIT II	- Finance
UNIT III	- Collection System & Public Relations
UNIT IV	- Surveys & Schedules
UNIT V	- Maintenance
UNIT VI	- Vehicle Operating Costs
UNIT VII	- Transport Planing Process
UNIT VIII	- Factory, Shop floor Management and Motor Transport
UNIT IX	- Vehicle Sales
UNIT X	- Service and Insurance

UNIT I: Organizational Structure

Powers and Functions – Man power – planning and management – Quick response techniques.

UNIT II: Finance

Methods of Financing – Private participation – Budgeting – Modern methods of accounting – Fare structure.

UNIT III: Collection system & Public Relations

Fare collection systems – Revenue leakage & prevention – Incentives – Public relations.

UNIT IV: Surveys & Schedules

Route surveys – Route planning and rationalization – Preparation of schedules – Travel time & accident studies.

UNIT V: Maintenance

Fleet Maintenance – Depot – Location – Organization & Operation – Store.

UNIT VI: Vehicle Operating Costs

Introduction – Earlier work done abroad – Road user cost study in India – Components of VOC – Factors affecting VOC – Fuel consumption relationship – Spare parts consumption – Maintenance and repairs labour cost – Tyre life – Lubricants – Utilisation and fixed costs – Value of Travel Time Savings – classes of transport users enjoying travel time savings – Economic concept of evaluation of travel time savings – Certain issues connected with evaluation of time savings enjoyed by passengers – Methodology for monetary evaluation of passengers travel time – Review of work in India on travel times.

UNIT VII: Transport Planning Process

Congestion as a factor in road traffic – Traffic restraint – road pricing – Interdependence of the land use and traffic – Systems approach to transport planning – stages in transport planning – survey and analysis of existing conditions – forecast, analysis of future conditions and plan synthesis – Evaluation – Programme adoption and implementation – continuing study – citizen participation – difficulties in the transport planning process.

UNIT VIII: Factory, Shop Floor Management and Motor Transport

Production management – plant layout planning and control – scheduling PERT – CPM quality control – guarage planning – layout of tools. Repair shop lay-outs – Materials handling equipment – purchase and sales – Goods vehicle and passenger vehicle operation – Driver, conductor schedule vehicle schedule – Fare table calculation – Settlement of claims – Transhipment – way bill – operating cost calculation – motor vehicle act – warranty claims.

UNIT IX: Vehicle Sales

Organization – administration and equipment or vehicle sales – sales department records and financial budget – Sales depreciation – formula for vehicle sale – importance of customers satisfaction – professional approach for sale – Business in motor trade selection of proposer type of vehicle of suit the conditions an aspects of transport – comparison between electric trolly – bus with conventional bus – merits and demerits.

UNIT X Service and Insurance

Charging pattern of automobile maintenance and service – basic services – service promotion – selection and progressive planning of site – layout for maximum productivity – Duties and rights of a receptionist – qualification of receptionist – reception procedure – handling of customer's complaints – Vehicle history and follow up systems – franchise holders warranty – Accident repair work insurance – assessors and engineers – dealing of insurance work – policy excess payments – accident claim form – Preparation and form of estimate – conditional clauses – completion note

Reference books:

Traffic Engineering & Transport Planning	- L.R. Kadiyali
Motor Transportation	- Hudson & Constantin
Transport in Modern India	- K.P. Bhatnagar, Satish Bahadur and D.N. Agrawal
High Engineering	- Khana & Josto, C.E.G.

AMD00-E02
ROAD TRAFFIC ENGINEERING

Major Divisions:

UNIT-I - Traffic Engineering
UNIT-II - Speed, Journey Time and Delay Surveys
UNIT-III - Parking
UNIT-IV - Traffic Signs
UNIT-V - Road Markings
UNIT-VI - Regulation of Traffic
UNIT-VII - Road Accidents-Causes and Prevention
UNIT-VIII - Transportation System Management
UNIT-IX - Nature of Traffic Problems in Cities
UNIT-X - Public Transport in Cities

UNIT-I - Traffic Engineering

Definition-Traffic Engineering-functions-Organisation of the Traffic Engineering Department-Importance of Traffic Engineering under Indian Conditions.

The Road User and the vehicle:

Introduction-Human Factors Governing Road User Behaviour-Power Perormance of vehicles-Other vehicle Characteristics- Deceleration of Vehicles Costing-Characteristics of slow Moving Traffic in India.

UNIT-II - Speed, Journey Time and Delay Surveys

Introduction-User of speed, Journey Time and Delay Studies-Methods of Measuring spot Speeds- Direct-Timing Procedure for Spot Speed Determination-Enoscope-Pressure Contact Tubes- Short-Base Methods of Determining Spot Speeds- Radar Speed Meters-Photographic Method and Video Camera Method-Methods for Measurement of Running Speed and Journey Speed- Moving Observer Method- Illustrative problems-Registration Number Method-Elevated Observer Method-Presentation of Travel Time and Journey Speed Data-Delay Studies.

Vehicle Volume Counts, Classificationi and Occupancy:

Need for Vehicle Volume, Classification and Occupation Counts-Types of Counts-Method Available for Traffic Counts- Manual Methods- Combination of Manual and Mechanical Method-Automatic Devices-Planning and Programming Traffic Counts-Vehicle Occupancy Surveys.

Traffic Forecasting:

Need for Traffic Forecasting-Limitations of Traffic Forecasting- Types of Traffic Current Traffic-existing and attracted, Traffic Increase-Forecasts based on Past Trends and Extrapolation.

UNIT-III - Parking

Traffic and Parking Problems- Effects of Parking- Zoning and Parking Space Requirement Standards- Design Standards for On-street Parking Facilities- Traffic Regulatory Measures for On-Street Parking- Off-street Parking Facilities- Peripheral Parking Schemes-Loading and Unloading Facilities- Truck Terminals-Long Distance Bus terminals.

UNIT-IV - Traffic Signs

Importance of Traffic Signs-Need for International Standardization-The Situation in India-General Principles of Traffic Signing-Danger Signs (Warning Signs or Cautionary Signs)-Prohibitory Signs- Mandatory signs-Informatory signs- Indication signs- Direction signs-Advance Direction Signs and Place Identification Signs-Overhead Signs -Route Marker Signs-Location, Height and Maintenance of Traffic Signs.

UNIT-V - Road Markings

Function-Types of Road Markings-General Principles of Longitudinal Pavement Markings-Material and Colour- Centre Lines- Traffic Lane Lines-No Overtaking Zone Markings-Pavement Edge Lines- Carriage way Width Reduction Transition Markings-Obstruction Approach Markings-Stop Lines-Pedestrian Crossings- Cyclist Crossings-Route Direction Arrows-Word Messages-Markings at Approaches to Intersections-Parking Space Limits-Object Markings.

UNIT-VI - Regulation of Traffic

Basic Principles of Regulation-Regulation of Speed-Regulation of Vehicles-Regulation Concerning the Driver- Regulations Concerning Traffic- General Rules Concerning Traffic-Parking Regulations-Enforcement of Regulations.

UNIT-VII - Road Accidents-Causes and Prevention

Road Accidents and the Traffic Engineer-Accident Situation in India-International Comparison of Road Accidents- Collection of Accident Data-Statistical Method for analysis of Accident Data-Road and its Effect on Accidents-The Vehicle- The Driver-Skidding-Speed in Relation to Safety-Weather and its Effect on Accidents- Pedestrian Safety-Cyclists- Motor-cycle and Scooter Riders-Parking and its influence on Accidents-Traffic Management Measures and their influence in Accident Prevention-Legislation, Enforcement, Education and Propaganda -Cost of Road Accidents.

UNIT-VIII - Transportation System Management

Introduction-Travel Demand Management-Traffic Management:Scope of Traffic Management Measures, Restrictions of turning movements, One-way streets.

UNIT-IX - Nature of Traffic Problems in Cities

Growth of Towns-Growth of Traffic-Nature of the Present Difficulties in Urban Traffic Conditions-Measures to meet the Problems-Land use and City Planning Controls-Transportation Studies Needed-Traffic Restraint Measures-Promotion of Public Transport-Pedestrianisation-Staggering of Office Hours- Promotion of Bicycle Traffic

UNIT-X - Public Transport in Cities

Planning for Public Transport-Fares and subsidies.

Traffic and the Environment:

Introduction-Detrimental Effects of Traffic on the Environment-Noise- Air Pollution-Vibration-Visual Intrusion and Degrading the Aesthetics- Severance and Land Consumption-Evaluation Procedures-Environmental Areas-Situation in India.

Transportation and Energy:

Introduction-Factors Affecting Fuel Consumption of Motor Vehicles-Effect of Road condition on Fuel Consumption of Vehicles-Measures for Economy of Fuel in Road Transport- Fuel Economy in Rail Transport-Fuel Economy in Other modes on Transport.

Books for Reference:

Traffic Engineering & Transport Planning	: L.R. Kadiyali
Motor Transportation	:by Hudson & Constantin
Transport in Modern India	: by K.P. Bhatnagar, Satish Bahadur, & D. N. Agarwal
High Engineering	:by Khana & Josto, C.E.G.

AMD00-E03
ENGINE POLLUTION AND CONTROL

Major Divisions:

UNIT-I - Pollution, Engines and Turbines
UNIT-II - Pollutant Formation
UNIT-III - Pollution Measurement
UNIT-IV - Control for S.I. Engine Pollution
UNIT-V - Driving Cycles and Emission Standards
UNIT-VI - Diesel Engine, Combustion and Emissions
UNIT-VII - Control for C.I. Engine
UNIT-VIII - Effects for C.I. Engine
UNIT-IX - Two wheeled vehicle
UNIT-X - Emission Control and Computer System

UNIT-I - Pollution, Engines and Turbines

Atmospheric pollution from piston engines and gas turbines-Global warming.

UNIT-II - Pollutant Formation

Formation of oxides of nitrogen- Carbon monoxide Hydrocarbon- Aldehydes and Smoke-Particular emission -Effects of pollutions on environment

UNIT-III - Pollution Measurement

Non dispersive infrared gas analyzer- Gas chromatography-Chemiluminescent analyzer and flame ionization detector- Smoke measurement- Noise pollution- Measurement and control.

UNIT-IV - Control for S.I. Engine Pollution

Engine component- Fuel modification Evaporative emission control-EGR-Air injection-Thermal reactors- in cylinder control of pollution- catalytic converters-Application of microprocessor in emission control.

UNIT-V - Driving Cycles and Emission Standards

Use of driving cycles for emission measurement- Chassis dynamometer-CVC System- National and International emission standards.

UNIT-VI - Diesel Engine, Combustion and Emissions

Basic of diesel combustion-Smoke emission in diesel engine-No emission from diesel engines-Particulate emission in diesel engines-Odor and Aldehyde emissions from diesel engines.

UNIT-VII - Control for C.I. Engine

Design changes-Optimisation of operating factors- EGR- Fumigation-Air injection-Thermal reactors.

UNIT-VIII - Effects for C.I. Engine

Short-term toxicity illustrated by the case of CO- Milrogen oxides- Ozone and oxidants- Hydro carbons- Aldehydes-Super compounds- Alcohols- Diesel particulates- Mineral particles.

UNIT-IX - Two wheeled vehicles and two stroke engines emission formation-Controls the emission methods.

UNIT-X - <u>Emission Control and Computer System</u>

Throttle positioner- Mixture control valve- Spark control system- Thermal reactor- Bosch electronic fuel injection-Toyotx electronically controlled transmission.

Books for Reference:

Automotive Emission Control	: Crouse William
Combustion Generated Air Pollutions	: Ernest S. Starkman
Engine Emissions, Pollutant Formation and Measurement	: George, Springer and Donald J. Patterson
Internal Combustion Engines and Air Pollution	: Obert, E. F.
Automobiles and Pollution	: Paul Degobert
Automotive Emission Control and Computer System	: Don Knowles

AMD00-E04 ALTERNATE FUELS

Major Divisions:

UNIT-I - Fuels
UNIT-II - Alcohol Fuels
UNIT-III - Gaseous Fuels
UNIT-IV - Vegetable Oils
UNIT-V - Natural Gas
UNIT-VI - Storage and Dispension
UNIT-VII - Methanol
UNIT-VIII - Hydrogen
UNIT-IX - Vegetable Oils
UNIT-X - Electricity

UNIT-I - Fuels

Availabitlity and suitability to piston engines- Concept of conventional fuels-potential alternative fuels- Ethanol, Methanol, DEE/DME-Hydrogen, LPG, Natural gas, Producer gas, Bio gas and Vegetable oils- Use of I. C. Engines- Merits and demerits of various fuels.

UNIT-II - Alcohol Fuels

Properties as engine fuels- Performance in S. I. Engines- Alcohol & Gasoline blends- Flexible fuel vehicle- Reformed alcohol- Use in C.I. Engines-Emulsions-Dual fuel systems- spark assisted diesel engines- Surface ignition engines- Ignition accelerators- Manufacture of alcohol fuels.

UNIT-III - Gaseous Fuels

Hydrogen- Properties- Use in C.I. Engines- Use in S.I.Engines- Storage methods- Safety precautions- Production methods, producer gas and bio gas- Raw materials- Gasification-Properties-Cleaning up the gas-Use in S.I. and dual fuel engines, LPG & Natural gas-Properties - Use in S.I. and C.I. Engines.

UNIT-IV - Vegetable Oils

Properties-Esterification-Performance in Engines.

UNIT-V - Natural Gas

Production-Vehicle performance-Light duty Heavy duty vehicle- Vehicle emissions characteristics- Properties and specifications of natural gas-CNG-LNG

UNIT-VI - Storage and Dispension

Methanol- Alcohols-Ethanol-Natural gas-CNG-LNG- Location of storage tank-Vehicle storage and maintenance.

UNIT-VII - Methanol

Ethanol- Properties- Vehicle performance-Storage location in vehicle-Fire protection-Vehicle emissions characteristics.

UNIT-VIII - Hydrogen

Properties and specifications-Materials compatibility-Storage and dispensing-Refusing facility-Modifications-Fire protection- Location and installation of fuel in vehicle- Vehicle charging facilities.

UNIT-IX - Vegetable Oils

Refueling facility and specifications-Materials compatibility-Storage-Vehicle fire protection-Vehicle emission characteristics.

UNIT-X - <u>Electricity</u>

Sizing of charger- Location of charger-Charging facilities- Fire protection.

Books for Reference:

Present and Future Automotive Fuels : Osamu Hirao and Richard K. Pefley

Automotive Fuels Handbook : Keith Owen and Trevor Eoley

Automotive Fuels Guide Book : Richard L. Bechtold

Alternative Fuels Guide Book : Richard L. Bechtold

AMD00-E05 ENGINE ELECTRONICS

Major Divisions:

UNIT-I - Introduction
UNIT-II - Microprocessor
UNIT-III - Sensors
UNIT-IV - Gasoline Injection System
UNIT-V - Diesel Injection System
UNIT-VI - Ignition Systems
UNIT-VII - Engine Mapping
UNIT-VIII - Comparing Contract Point and Electronic Ignition
UNIT-IX - Electronic Carburettor Fuel System
UNIT-X - Electronic Controls for Fuel Injection

UNIT-I - Introduction

Inductance- Capacitance-Semiconductors- The transistors- Integrated circuit- Electronic construction techniques- Engine management systems like-Emission-Combustion process.

UNIT-II - Microprocessor

Architecture Intel 8085, Instruction set-Assembly language programming- Data transfer schemes-interfacing devices- Automobile application.

UNIT-III - Sensors

Types-Air flow, pressure, temperature, speed, oxygen-detonation, position-Principle of operation, arrangement and material.

UNIT-IV - Gasoline Injection System

Open loop and closed loop systems- Mono point -Multi point and direct injection systems-Principles and features- Bosch injection systems.

UNIT-V - Diesel Injection System

Inline injection pump and injector- Construction and principle of operation-Common rail and unit injector system- Construction and principle of operation.

UNIT-VI - Ignition Systems

Ignition fundamentals- Types of solid state ignition systems-High energy ignition distributors-Electronic spark timing and control.

UNIT-VII - Engine Mapping

Combined ignition and fuel management systems- Digital control techniques- Dwell angle calculation-Ignition timing calculation and injection duration calculation- Hybrid vehicles and fuel cells.

UNIT-VIII - Comparing Contract Point and Electronic Ignition

Chryster electronic ignition-Ford electronic ignition-Ford Dura-spark electronic ignition- High energy ignition-Spark advance controls- Electronic lean -Burn system-No distributor ignition system-Thermactor system-Electronic ignition service-Backfire-Miss fre-Over heat- Detonates or pings- Testing of ignition-distributor service.

UNIT-IX - Electronic Carburettor Fuel System

Electronic control of the air-fuel ratio- Fuel control- Carburettor control- Servicing of electronic controls-Vegetable oil- Hydrogen.

UNIT-X - <u>Electronic Controls for Fuel Injection</u>

Cadillac fuel injection and throttle injection- Servicing electronic fuel injection system.

Books for Reference:

Automotive Computers and Digital Instrumentation : Robert N. Brady

Bosch Technical Instruction Booklets

Automotive Electrical and Electronics Systems : Tom Denton

Auto Fuel Systems : Duffy Smith

Advanced Engine Technology : Heinz Heisler

Automotive Electronic and Electrical Equipment : William H. Crouse

Automobile Electronics : Eric Chowanietz