

DETAILED SYLLABUS
FOR DISTANCE EDUCATION

Under Graduate Degree Program

Diploma
(Automobile Engineering)
(SEMESTER SYSTEM)

COURSE TITLE
DURATION

: Diploma in Automobile Engineering (DAE)
: 04 Years (Semester System)

FIRST SEMESTER

COURSE TITLE	Paper Code	MARKS				TO-TAL
		THEORY		PRACTICAL		
		INTER-NAL	EXTER-NAL	INTER-NAL	EXTER-NAL	
APPLIED MATHEMATICS I		40	60			100
PHYSICS		40	60	40	60	200
CHEMISTRY		40	60	40	60	200
FUNDAMENTALS OF COMPUTERS		40	60			100
COMMUNICATION TECHNIQUES		40	60			100

SECOND SEMESTER

COURSE TITLE	Paper Code	MARKS				TO-TAL
		THEORY		PRACTICAL		
		INTER-NAL	EXTER-NAL	INTER-NAL	EXTER-NAL	
APPLIED MATHEMATICS II		40	60			100
BASIC MECHANICAL ENGINEERING				40	60	200
BASIC ELECTRICAL ENGINEERING		40	60			100
BASIC ELECTRONICS		40	60			100
ENGINEERING DRAWING		40	60			100

THIRD SEMESTER

COURSE TITLE	Paper Code	MARKS				TO-TAL
		THEORY		PRACTICAL		
		INTER-NAL	EXTER-NAL	INTER-NAL	EXTER-NAL	
MODELLING & ANALYSIS OF HEAT TRANSFER	DAE-310	40	60			100
MATERIAL DCIENCE	DAE-320 DAE-320P	40	60	40	60	200
PRODUCTION TECHNOLOGY	DAE-330 DAE-330P	40	60	40	60	200

UTILIZATION OF SOLAR ENERGY	DAE-340	40	60			100
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FORTH SEMESTER

COURSE TITLE	Paper Code	MARKS				TO-TAL
		THEORY		PRACTICAL		
		INTER-NAL	EXTER-NAL	INTER-NAL	EXTER-NAL	
AUTOMOBILE ENGINEERING	DAE-410 DAE-430P	40	60	40	60	200
VEHICLE MECHANISM & DYNAMICS	DAE-420	40	60	40	60	200
COMBUSTION & PROPULSION	DAE-430 DAE-430P	40	60	40	60	200
CRYOGENIC SYSTEMS	DAE-440	40	60			100

FIFTH SEMESTER

COURSE TITLE	Paper Code	MARKS				TO-TAL
		THEORY		PRACTICAL		
		INTER-NAL	EXTER-NAL	INTER-NAL	EXTER-NAL	
AUTOMOBILE TECHNOLOGY (PETROL ENGINES)	DAE-510 DAE-510P	40	60	40	60	200
DIESEL ENGINES	DAE-520 DAE-520P	40	60	40	60	200
TRANSMISSION AND CONTROLS	DAE-530	40	60			100
INDUSTRIAL MANGEMENT AND ROAD TRANSPORT	DAE-540	40	60			100

SIXTH SEMESTER

COURSE TITLE	Paper Code	MARKS				TO-TAL
		THEORY		PRACTICAL		
		INTER-NAL	EXTER-NAL	INTER-NAL	EXTER-NAL	
BODY BUILDING TECHNOLOGY	DAE-610	40	60			100
DESIGN OF MACHINE ELEMENTS	DAE-620 DAE-620P	40	60	40	60	200

COMPUTER AIDED DESIGN AND DRAFTING	DAE-630 DAE-630P	40	60	40	60	200
OIL HYDRAULLIC AND PNEUMATIC SYSTEMS AND CIRCUITS	DAE-640 DAE 640 P	40	60	40	60	200

Note:

Theory Paper : 40% Continuous Internal Assessment and 60 % University examination.

Practical Paper: 40 % Continuous Internal Assessment and 60 % University examination.

Continuous Internal Assessment:

- 1) Two or three tests out of which minimum two will be considered for Assessment **60% of Continuous Internal Assessment**
- 2) Seminars/Assignments/Quizzes **30% of Continuous Internal Assessment**
- 3) Attendance, class participation and behavior **10% of Continuous Internal Assessment**

SYLLABUS
DIPLOMA IN AUTOMOBILE ENGINEERING
SEMESTER – I

APPLIED MATHEMATICS I

Sub. Code: DCE 101

Credits: 02

Total Marks: 100

Minimum Pass Marks: 40%

Internal Assessment: 40 Marks

University Examination: 60 Marks

BLOCK I

Unit 1: Algebra - 1

Application of Quadratic Equations; Simultaneous Equations (One Linear and Other Quadratic Equation) in Two Variables to Engineering Problems. Arithmetic Progression, its nth Term and Sum of n Terms with their Applications to Engineering Problems. Geometrical Progression, its nth Term and Sum of n Terms and to Infinity with Application to Engineering Problems.

Unit 2: Algebra – 2

Partial Fractions (Excluding Repeated Quadratic Factors)

Introduction to Permutations & Combinations; Applications of Formulae. Binomial Theorem (Expansion without Proof) for Positive Integral Index (Expansion and General Term); Binomial Theorem for any Index (Expansion without Proof only); First and Second Binomial Approximation with Application to Engineering Problems. Logarithm General Properties of Logarithms, Calculations of Engineering Problems using Log Tables

Unit 3: Determinants and Matrices

Determinants and Matrices-Expansion of Determinants (up to Third Order) using Sarrus Rule, Expansion Method and Pivotal's Condensation Method; .Properties of Determinants; Solutions of Equations (up to 3 unknowns) by Cramer's Rule; Definition of Matrix; Addition, Subtraction and Multiplication of Matrices (up to Third Order); .Inverse of a Matrix by Ad-joint Method and Elementary Row Transformations. Solution of Equations (up to 3 unknowns) by Matrix Method

BLOCK II

Unit 4: Trigonometry

Addition and Subtraction Formulae; Product Formulae and their Application in Engineering Problems; Transformation from Product to Sum or Difference of Two Angles and vice versa; Multiple and Sub-multiple Angles. Conditional Identities; Solution of Triangles (excluding Ambiguous Cases). Graphs of $\sin x$, $\cos x$, $\tan x$ and e^x

Unit 5: Vectors

Definition of Vector and Scalar Quantities; Addition and Subtraction of Vectors; Dot Product and Cross Product of Two Vectors; .Thumb Rule; Angle between Two Vectors; Application of Dot and Cross Product in Engineering Problems

Unit 6: Complex Numbers

Definition; Real and Imaginary Parts of a Complex Number; Polar and Cartesian Representation of a Complex Number and Conversion from One to the Other; Conjugate of a Complex Number; Modules and Argument of a Complex Number.

Suggested Readings:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers.
2. Mathematics Vol. I, SS Sabharwal et. al., Eagle Prakashan.
3. Mathematics Vol. II, SS Sabharwal et. al., Eagle Prakashan
4. Advanced Engineering Mathematics, A B Mathur and V.P. Jagi; Khanna Publishers.
5. Engineering Mathematics, C Dass Chawla, Asian Publisher.
6. Engineering Mathematics, S Kohli and others, IPH.

Note:

1. Eight questions are to be set, at least one question from each unit. Students will have to attempt five questions in all.
2. Use of non-programmable scientific calculator is allowed in Examination Hall.

**SYLLABUS
DIPLOMA IN AUTOMOBILE ENGINEERING
SEMESTER – I**

PHYSICS

Sub. Code: DCE 102

Credits: 02

Total Marks: 100

Minimum Pass Marks: 40%

Internal Assessment: 40 Marks

University Examination: 60 Marks

BLOCK I:

Unit 1: Units & Dimensions

Fundamental and Derived Units in SI System; Dimensions of Physical Quantities; Principle of Homogeneity; Dimensional Equation; Applications of Dimensional Analysis; Checking the Correctness of Physical Equations; Derivation of Simple Physical Relations; Limitation of Dimensional Analysis.

Unit 2: Force & Motion

Scalars and Vectors; Velocity & Acceleration; Equations of Motion; Newton's Laws of Motion; Composition and Resolution of Forces; Motion of Projectiles: Parabolic Motion, Trajectory, Time of Flight, Horizontal Range and Maximum Horizontal Range, Centripetal Acceleration; Centripetal and Centrifugal Forces; Concept of Friction..

Unit 3: Work, Power and Energy

Work and its Units; Work Done on Bodies Moving on Horizontal and Inclined Planes; Concept of Power and its Units; Calculations of Power (Simple Cases); Concept of Kinetic Energy and Potential Energy; Law of Conservation of Energy; Conservation of Energy in Case of Freely Falling Bodies.

Unit 4: Waves and Vibrations

Simple Harmonic Motion (SHM): Definition, Dynamics of Simple Harmonic Motion; Energy of Simple Harmonic Motion; Vibration: Types of Vibration; Vibration Analysis: Free Vibration without Damping, Free Vibration with Damping, Forced Vibration, Resonant Vibration; Wave Motion: Types of Wave, Transverse and Longitudinal and Surface Wave, Relation between Velocity of Wave, Frequency and Wave Length of a Wave; Sound and Light Waves; Applications of Sound Waves in Engineering.

BLOCK II

Unit 5: Heat

Concept of Heat and Temperature; Unit of Temperature; Basic Principles and Methods of Measurement of Temperature: Thermocouple, Resistance and Bimetallic Thermometer, Pyrometers, Clinical and other Thermometers; Three Modes of Transfer of Heat: Conduction, Convection, Radiation, Coefficient of Thermal Conductivity, Thermal Resistance; Expansion of Solids: Linear

thermal expansion coefficient, Surface thermal expansion coefficient, Volume thermal expansion coefficient, Relation amongst Three thermal expansion coefficients; Heat Radiation: Characteristics of Heat Radiation; Prevost's Theory; Black Body Radiations: Emissivity and Absorbivity, Kirchoff's Law, Stefan's Law.

Unit 6: Principle of Optics

Reflection of Light: Laws of Reflection; Refraction of Light: Refractive Index; Concept of Mirror: Convex Mirror, Concave Mirror, Mirror Equation and Magnification; Concept of Lens: Lens Formulae, Real and Virtual Image, Magnification Power of Lens; Simple and Compound Microscope; Optical Telescope; Total Internal Reflection: Critical Angle, Conditions for Internal Reflection

Unit 7: Electrostatics

Coulombs Law: Electric and Magnetic Constants, Unit Charge, Electric Field, Electric Field of Point Charge, Electric Flux; Gauss's Law: Electric Field of Point Charge, Electric Field of Conducting Sphere, Electric Field: Outside a Sphere of Uniform Charge, Electric Field: Inside a Sphere of Charge, Electric Field of Line Charge, Electric Field: Conducting Cylinder, Electric Field: Sheet of Charge, Electric Field: Parallel Plates.

Unit 8: Electricity and Magnetism

Ohm's Law: Specific Resistance; Kirchoff's Laws; Wheatstone Bridge: Operation and Significance; Joule Effect - Heating Effect of Current: Concept of Electric Power; Magnetic Fields and Forces; Magnetic Fields due to Current; Ampere's Law; Faraday's Law of Induction: Lenz's Law, Self Induction, Mutual Induction

Suggested Readings:

1. Applied Physics Vol. I & II, TTTI Publication Tata McGraw Hill.
2. Basic Applied Physics, RK Gaur; Dhanpat Rai and Co.
3. Numerical Problems in Physics: Volume I and II by RS Bharaj; Tata McGraw Hill
4. Text book of Physics, Vol. I & II, Resnik and Halliday, Wiley India.
5. Engineering Physics, R. Gaur & S. L. Gupta, Dhanpat Rai and Co.

Note:

1. Eight questions are to be set. Students will have to attempt five questions in all.
2. Use of non-programmable scientific calculator is allowed in Examination Hall.

SYLLABUS
DIPLOMA IN AUTOMOBILE ENGINEERING
SEMESTER – I

CHEMISTRY

Sub. Code: DCE 103

Credits: 02

Total Marks: 100

Minimum Pass Marks: 40%

Internal Assessment: 40 Marks

University Examination: 60 Marks

BLOCK I

Unit 1: Structure of Atom

Introduction; Fundamental Particles of Atom; Electron, Proton and Neutron.; Bohr's Model of Hydrogen Atom; Line Spectrum of Hydrogen Atom; Limitation of Bohr's Model; Modern Concept of Atom; Four Quantum Numbers; Pauli's Exclusion Principle; Types of Bonds; Modern Periodic Table of Elements.

Unit 2: Chemical Equation, Oxidation & Reduction

Basic Concept of Elements; Mixture and Compound; Chemical Equation, its Balancing; Implications and Limitations.

Concept of Oxidation & Reduction: Electronic Concept of Oxidation and Reduction, Redox Reactions (Direct and Indirect), Oxidation No, Balancing of Simple Redox Reactions by Oxidation No.

Unit 3: Ionic Equilibrium

Ionization; Degree of Ionization; Focus Effecting Ionization; Ionization of Water; Ionization Equilibrium in Aqueous Solutions; Common Ion Effect.

BLOCK II

Unit 4: Acids & Bases

Concept of Acids and Bases & their Strength in Ionization Constant; PH Value; Acid Base Titration; Choice of Indicators; Hydrolysis; Buffer Solution.

Unit 5: Electrolysis:

Introduction; Concept of Electrolysis; Faraday's Law of Electrolysis; Engineering Applications; (Electro-Metallurgy; Electroplating & Electro-Refining).

Unit 6: Water

Hard and Soft Water; Removal of Hardness by A) Soda Lime Process), Permutit's Process, C). Ion Exchange Method.

Disadvantages of Hard Water in Industrial Use; Boiler Scales; Priming; Foaming Corrosion and Caustic Embitterment; Expressing the Degree of Hardness of Water in (with Simple Problems): A) Clark's Degree, B) O'Hener's Method; Determination of Degree of Hardness by (with Simple Problems): A) Soap Titration Method, B) O'Hener's Method; Water for Drinking Purposes.

Unit 7: Solutions & Colloids:

Solute; Solvent; Solution & Colloids; Particle Size and Colloidal State; Tyndell Effect; Brownian Movement; Coagulation.

Suggested Readings:

1. Chemistry in Engineering, J.C. Kuriacose and J. Rajaram, Tata McGraw-Hill.
2. Chemistry in Engineering, Dr. S. Rabindra and Prof. B.K. Mishra, Kumar and Kumar Publishers.
3. A Text Book of Applied Chemistry-I, SS Kumar, Tata McGraw Hill.
4. A Text Book of Applied Chemistry-I, Sharma and Others, Technical Bureau of India.

Note:

1. Eight questions are to be set. Students will have to attempt five questions in all.
2. Use of non-programmable scientific calculator is allowed in Examination Hall

**SYLLABUS
DIPLOMA IN AUTOMOBILE ENGINEERING
SEMESTER – I**

FUNDAMENTALS OF COMPUTERS

Sub. Code: DCE 104

Credits: 02

Total Marks: 100

Minimum Pass Marks: 40%

Internal Assessment: 40 Marks

University Examination: 60 Marks

BLOCK I

Unit 1: Introduction to Computer System

An Overview of the Computer System; the Processor (CU; ALU); Factors Affecting Processor Speed; the Bus: Data Bus and Address Bus; Memory (RAM; ROM; Registers; Cache).

Unit 2: I/O Devices

Introduction; I/O Devices: Mouse, Keyboard, Monitors, Printers, Pens, Touch, Screens, Microphones, and Voice Recognition; Storage Devices: Diskettes, Hard Disc, CD-ROM; Computer Categorization.

Unit 3: Introduction to Networks

Networks-Uses; Categories & Topologies; System Software and Application Software; Operating System; User Interface; Resource Management; Utility Software.

BLOCK II

Unit 4: Introduction to Database Management

Word Processing and Desktop Publishing; Spreadsheets; Basics of Database Management.

Unit 5: Programming Languages

Programming Language: High-level language, Low Level Language & Assembly language; Major Features of the Internet; Working with Graphics.

Unit 6: Information Systems

Types of Information Systems; System Development Life Cycle.

Suggested Readings:

1. Computer Fundamentals, P.K Sinha, BPB Publications.
2. Computers Today, Suresh .K Basandra, Galgotia Publications Private Ltd.
3. Computer Installation Troubleshooting, M. Radha Krishnan & D. Balasubramanian, ISTE Learning Material.
4. Computer Organization & Design, P. Pal Chaudhuri, Prentice Hall of India.

Note:

1. Eight questions are to be set; at least one question from each unit. Students will have to attempt five questions in all.
2. Use of non-programmable scientific calculator is allowed in Examination Hall

**SYLLABUS
DIPLOMA IN AUTOMOBILE ENGINEERING
SEMESTER – I**

COMMUNICATION TECHNIQUES

Sub. Code: DCE 105

Credits: 02

Total Marks: 100

Minimum Pass Marks: 40%

Internal Assessment: 40 Marks

University Examination: 60 Marks

BLOCK I

Unit 1: Correspondence (Official, Business and Personal)

One Letter from each Category - Official, Business and Personal may be set in the examination paper and the students be asked to write one of them.

Unit 2: Grammar

A Brief Review of Easy Form of Tenses; Conversion of Direct Narration into Indirect Form of Narration and Vice Versa (only Simple Sentences); Punctuation.

Unit 3: Essay

Preferably on Scientific Topic from the given outlines - the Paper Setter may be instructed to give a choice of attempting one out of three topics. The question paper may provide the outlines. The essay will be of 250 to 300 words. The examiner may select three topics one from each of the following.

- A) Science;
- B) Technology;
- C) General.

Suggested Readings:

1. Text Book on English and Communication Skills, Book-I, Kuldeep Jaidka et.al. Developed by NITTR, Chandigarh.
2. New Design English Grammar: Reading and Writing Skills, (Course A and course B), A. L. Kohli; Kohli Publishers.
3. New Design English Reading and Advanced Writing Skills for Class XI and XII, M. K Kohli and A. L Kohli, Kohli Publishers.

Note:

1. Six questions are to be set; at least one question from each unit. Students will have to attempt four questions in all.
2. Use of non-programmable scientific calculator is allowed in Examination Hall.

**SYLLABUS
DIPLOMA IN AUTOMOBILE ENGINEERING
SEMESTER – II**

APPLIED MATHEMATICS II

Sub. Code: DCE 201

Credits: 02

Total Marks: 100

Minimum Pass Marks: 40%

Internal Assessment: 40 Marks

University Examination: 60 Marks

BLOCK I

Unit 1: Co-ordinate Geometry -1

Area of Triangle, Centroid and In centre of Triangle (given the Vertices of a Triangle), Simple Problems on Locus. Equation of Straight Lines in Various Forms (without Proof) with their Transformation from one to another; Angle between Two Lines and Perpendicular Distance Formula (without Proof).

Unit 2: Co-ordinate Geometry -2

Circle: General Equation and its Characteristics given:

- The Centre and Radius;
- Three points on it;
- The Co-ordinates of the end's of the diameter.

Conics: Parabola, Ellipse and Hyperbola; Standard Equation of Conics (without Proof); Given the Equation of Conics to Calculate Foci, Directrix, Eccentricity, Lotus Rectum, Vertices and Axis Related to Different Conics.

Unit 3: Differential Calculus -1

Concept of Function: Four Standard Limits:

$$\text{Lt } (x^n - a^n) / (x - a);$$

$$x \rightarrow a$$

$$\text{Lt } \sin x/x;$$

$$x \rightarrow 0$$

$$\text{Lt } (a^x - 1)/x;$$

$$x \rightarrow 0$$

$$\text{Lt } (1 + x)^{1/x}.$$

$$x \rightarrow 0$$

Concepts of Differentiation and its Physical Interpretation.

Differential by First Principle of x^n , $(ax + b)^n$, $\sin x$, $\cos x$, $\tan x$, $\text{cosec } x$ and $\cot x$, e^x , a^x , $\log x$

Differentiation of Sum, Product and Quotient of Different Functions.

Logarithmic Differentiation, Successive Differentiation excluding n^{th} order

Unit 4: Differential Calculus - 2

Application of Derivatives for (a) Rate Measure, (b) Errors, (c) Real Root by Newton's Method, (d) Equation of Tangent and Normal (e) Finding the Maxima and Minima of a Function (Simple Engineering Problems).

BLOCK II

Unit 5: Integral Calculus - 1

Integration as Inverse Operation of Differentiation.

Simple Integration by Substitution by Parts and by Partial Fractions

Evaluation of Definite Integrals (Simple Problems) by Expanding; the General Properties of Definite Integrals.

Unit 6: Integral Calculus - 2

Application of Integration for Simple Problem on Evaluation of Area under a Curve where Limits are prescribed for Circle, Ellipse, Parabola and Straight Line. Calculation of Volume of a Solid formed by Revolution of an Area about Axis (Simple Problems) where Limits are prescribed for Sphere and Cylinder. To calculate Average and Root Mean Square of a Function. Area by Trapezoidal Rule and Simpson's Rule.

Unit 7: Differential Equations

Solution of First Order and First Degree Differential Equation by Variable Separation and their Simple Numerical Problem.

Suggested Readings:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers.
2. Engineering Mathematics, C Dass, Chawla, Asian Publishers.
3. Engineering Mathematics, S. Dasgupta, McGraw-Hill.
4. Advanced Engineering Mathematics by A.B. Mathur and V.P Jaggi, Khanna Publishers.
5. Applied Mathematics Vol. II, RD Sharma, Khanna Publishers.
6. A text Book of Matrices, Shanti Narayan, S. Chand & Co.
7. Calculus and Analytical Geometry, Thomas/Finney, Narosa Publishing House.
8. Mathematics for Engineers, C.Prasad, Prasad Mudranalaya.
9. Differential & Integral Calculus, N Piskunov, Moscow Peace Publisher.
10. Higher Engineering Mathematics, Bird, J O, Butter worth-Heinemann.
11. Introduction to Engineering Mathematics, Croft, Davis & Hargreaves, Addison-Wesley.

Note:

1. Eight questions are to be set. Students will have to attempt five questions in all.
2. Use of non-programmable scientific calculator is allowed in Examination Hall.

**SYLLABUS
DIPLOMA IN AUTOMOBILE ENGINEERING
SEMESTER – II**

BASIC MECHANICAL ENGINEERING

Sub. Code: DCE 202

Credits: 02

Total Marks: 100

Minimum Pass Marks: 40%

Internal Assessment: 40 Marks

University Examination: 60 Marks

BLOCK I

Unit 1: Mechanical Properties of Metals

Definitions; Elasticity; Plasticity; Ductility; Brittleness; Toughness; Hardness; Malleability; Fatigue; Examples of Applications of above Terms Related to Engineering.

Unit 2: Basic Concept of Thermal Engineering

Energy: Internal Energy, Potential Energy, Kinetic Energy; Heat: Work and Enthalpy, Specific Heat, Specific Heat Ratio; Characteristics Gas Equation; Universal Gas Constant; First Law of Thermodynamics; Second Law of Thermodynamics.

Unit 3: Hydraulics

Physical Properties of a Fluid: Density, Specific Volume, Specific Weight, Specific Gravity Viscosity; Pascal's Law; Pressure Measuring Devices: Manometers, Simple Manometers, Differential Manometers, Inverted 'U' Tube, Pressure Gauges; Continuity Equation; Bernoulli's Theorem: Energy of a Fluid, Pressure Energy, Velocity Energy, Datum Energy; Venturimeter & its Uses.

Unit 4: Pumps and Turbine

Pumps: Types of Lumps, Centrifugal Pump, Reciprocation Pump, their Relative Advantages and Performance.

Turbine: Working Principles and Types of Water Turbines, Selection of Turbines, Brief Idea of Turbine, Pelton Wheel Turbine, Francis Turbine.

BLOCK II

Unit 5: Properties of Steam

Generation of Steam at Constant Pressure, Enthalpy of Water Wet Steam, Enthalpy of Dry Saturated Steam, Dryness Fraction, Superheated Steam, Latent Enthalpy, Enthalpy of Steam, Specific Volume, External Work During Evaporation, Internal Content Enthalpy, Internal Energy of Steam, Use of Steam Table

Unit 6: Boilers and Steam Turbines

Boilers: Classification of Boilers, Working of Common Boilers, Babcox and Wilcox, Chichram Boiler, Boiler Mounting and their Accessories, Introduction to Modern High Pressure Boiler for Thermal Power Station: Lamont Boiler, Weffler Boiler, Benson Boiler and Velox Boiler.

Steam Turbines: Introduction, Types of Steam Turbine, Working Principle of Steam Turbine Uses and Advantages of Steam Turbine.

Unit 7: I.C. Engines

I.C. Engine Cycle: Otto, Diesel; Working Principle: Two Stroke Petrol and Diesel, Four Stroke Petrol and Diesel.

Unit 8: Transmission and Lubrication

Transmission: Belt Drive, Rope Drive, Velocity Ratio, Tension Ratio, Effect of Centrifugal Tension; Application of these Drives.

Lubrication: Object of Lubrication, Different Methods of Lubrication, Properties of Lubricants.

Suggested Readings:

1. Thermodynamics & Heat Power Engineering, Mathur & Mehta, Jain Brothers.
2. Thermal Engineering, P.L. Ballaney, Khanna Publishers.
3. A Text Book of Hydraulics, Khurmi, S. Chand.
4. A Text Book of Hydraulic Machines, Khurmi, S. Chand.
5. Strength of Materials, G.H.Ryder, Macmillan, India.
6. Strength of Materials: A Rudimentary Approach, M.A. Jayaram, Sapna Book House.
7. Elements of Heat Engines: Pande & Shah, Charotar Publishing House.

Note:

1. Eight questions are to be set. Students will have to attempt five questions in all.
2. Use of non-programmable scientific calculator is allowed in Examination Hall.

**SYLLABUS
DIPLOMA IN AUTOMOBILE ENGINEERING
SEMESTER – II**

BASIC ELECTRICAL ENGINEERING

Sub. Code: DCE 203

Credits: 02

Total Marks: 100

Minimum Pass Marks: 40%

Internal Assessment: 40 Marks

University Examination: 60 Marks

BLOCK I

Unit 1: DC Circuits

Concept of Electricity; Various Applications of Electricity; Advantages of Electricity over other Types of Energy; Basic Terms: Voltage, Current, Potential Difference, Power; Energy and their Units. Ohm's Law and its Practical Applications; Concepts of Resistance, Conductance, Resistivity and their Units. Effect of Temperature on Resistance; Temperature Coefficient of Resistance. Series and Parallel Combination of Resistors; Wattage Consideration; Simple Problems. Kirchhoff's Current Law and Kirchhoff's Voltage Law and their Applications to Simple Circuits. Conversion of Circuits from Star to Delta and Delta to Star.

Unit 2: DC Circuits Theorems

Thevenin's Theorem; Norton's Theorem; Super Position Theorem; Maximum Power Transfer Theorem, Application of Network Theorem in solving D.C Circuit Problems. Constant Voltage and Constant Current Sources: A) Concept of Constant Voltage Source, Symbol and Graphical Representation, Characteristics of Ideal and Practical Sources, B) Concept of Constant Current Sources, Symbol, Characteristics and Graphical Representation of Ideal and Practical Current Sources.

Unit 3: Electro Magnetic Induction

- A) Concepts of Magnetic Field Produced by Flow of Current; Magnetic Circuit; Concept of Magneto-Motive Force (MMF); Flux; Reluctance; Permeability; Analogy between Electric and Magnetic Circuit.
- B) Faraday's Law and Rules of Electro-Magnetic Induction; Principles of Self and Mutual Induction; Self and Mutually Induced E.M.F; Simple Numerical Problems.
- C) Concept of Current Growth; Decay and Time Constant in RL and RC Circuit.
- D) Energy Stored in an Inductor; Series and Parallel Combination of Inductors.

Unit 4: Batteries

Basic Idea about Primary and Secondary Cells; Construction; Working and Applications of Lead-Acid Battery and Nickel-Cadmium Cells; Silver-Oxide Cells; Charging Methods used for Lead-Acid Battery (Accumulator); Care and Maintenance of Lead-Acid Battery; Series and Parallel Connections of Batteries; General Idea of Solar Cells; Solar Panels and their Applications

BLOCK II

Unit 5: AC Fundamentals

Concept of Alternating Voltage and Current; Difference between A.C and D.C; Concept of Cycle, Frequency, Time Period, Amplitude, Instantaneous Value, Average Value, R.M.S. Value, Maximum Value, Form Factor and Peak Factor; Representation of Sinusoidal Quantities by Phasor Diagrams; Equation of Sinusoidal Wave Form (with Derivation); Effect of Alternating Voltage Applied to a Pure Resistance, Pure Inductance and Pure Capacitance.

Unit 6: AC Circuits

Inductive Reactance and Capacitive Reactance; Alternating Voltage Applied to Resistance and Inductance in Series; Alternating Voltage Applied to Resistance and Capacitance in Series; Impedance Triangle and Phase Angle; Solutions and Phasor Diagrams for Simple RLC Circuits (Series and Parallel); Introduction to Series and Parallel Resonance and its Conditions; Power in Pure Resistance, Inductance and Capacitance, Power in Combined RLC Circuits; Power Factor; Active and Reactive Power and their Significance; Importance of Power Factor; J-Notation and its Application in Solving a Series and Parallel AC Circuits; Definition of Conductance, Susceptance and Admittance

Unit 7: Various Types of Power Plants

Brief Explanation of Principle of Power Generation in Thermal, Hydro and Nuclear Power Stations and their Comparative Study; Elementary Block Diagram of above Mentioned Power Stations.

Suggested Readings:

1. Electrical Technology, Vol. I, B.L. Theraja, S. Chand & Company Ltd.
2. Electrical Engineering, V.K. Mehta, S. Chand & Company Ltd.
3. Electrical Engineering,, Nitin Saxena, Laxmi Publisher.

Note:

1. Eight questions are to be set. Students will have to attempt five questions in all.
2. Use of non-programmable scientific calculator is allowed in Examination Hall.

SYLLABUS
DIPLOMA IN AUTOMOBILE ENGINEERING
SEMESTER – II

BASIC ELECTRONICS

Sub. Code: DCE 204

Credits: 02

Total Marks: 100

Minimum Pass Marks: 40%

Internal Assessment: 40 Marks

University Examination: 60 Marks

BLOCK I

Unit 1: Semiconductor Physics

Review of Basic Atomic Structure and Energy Levels; Concept of Insulators; Conductors and Semi Conductors; Atomic Structure of Ge and Si; Covalent Bonds. Concept of Intrinsic and Extrinsic Semi Conductor; P and N Impurities; Doping of Impurity. P and N Type Semiconductors and their Conductivity; Effect of Temperature on Conductivity of Intrinsic Semi Conductor. Energy Level Diagram of Conductors; Insulators and Semi Conductors; Minority and Majority Carriers.

Unit 2: Semi Conductor Diode

PN Junction Diode; Mechanism of Current Flow in PN Junction; Drift and Diffusion Current; Depletion Layer; Forward and Reverse Biased PN Junction; Potential Barrier; Concept of Junction Capacitance in Forward and Reverse Bias Condition. V-I Characteristics; Static and Dynamic Resistance and their Calculation from Diode Characteristics. Diode as Half Wave, Full Wave and Bridge Rectifier; PIV, Rectification Efficiencies and Ripple Factor Calculations; Shunt Capacitor Filter, Series Inductor Filter, LC Filter and π Filter. Types of Diodes; Characteristics and Applications of Zenor Diodes; Zenor and Avalanche Breakdown.

Unit 3: Introduction to Bipolar Transistor

Concept of Bipolar Transistor, Structure, PNP and NPN Transistor, their Symbols and Mechanism of Current Flow; Current Relations in Transistor; Concept of Leakage Current; CB, CE, CC Configuration of the Transistor; Input and Output Characteristics in CB and CE Configurations; Input and Output Dynamic Resistance in CB and CE Configurations; Current Amplification Factors. Comparison of CB CE and CC Configurations; Transistors as an Amplifier in CE Configurations; D.C Load Line and Calculation of Current Gain, Voltage Gain using D.C Load Line.

BLOCK II

Unit 4: Transistor Biasing Circuits

Concept of Transistor Biasing and Selection of Operating Point; Need for Stabilization of Operating Point; Different Types of Biasing Circuits.

Unit 5: Single Stage Transistor Amplifier

Single Stage Transistor Amplifier Circuit; A.C Load Line and its use in Calculation of Currents and Voltage Gain of a Single Stage Amplifier Circuit; Explanation of Phase Reversal of Output Voltage with respect to Input Voltage; H- Parameters and their Significance; Calculation of Current Gain; Voltage Gain; Input Impedance and Output Impedance using h-Parameter.

Unit 6: Field effect Transistors

Construction, Operation and Characteristics of FET and Its Application; Construction, Operation and Characteristics of MOSFET in Depletion and Enhancement Modes and its Applications; C MOS: Advantages and Applications; Comparison of JFET, MOSFET and BJT; FET Amplifier Circuit and its Working Principle. (No Analysis).

Suggested Readings:

1. Basic Electronics and Linear Circuit, NN Bhargava and Kulshreshta, Tata McGraw Hill.
2. Principles of Electrical and Electronics Engineering, VK Mehta; S Chand and Co.
3. Electronic Components and Materials, SM Dhir, Tata McGraw Hill.
4. Electronics Devices and Circuits, Millman and Halkias; McGraw Hill.
5. Principles of Electronics, Albert Paul Malvino; Tata McGraw Hill.
6. Electronics Devices and Circuits-I, Naresh Gupta, Jyotesh Malhotra and Harish C Saini, Eagle Prakashan.
7. Electronics Devices and Circuits by Rama Reddy, Narosa Publishing House Pvt. Ltd.

Note:

1. Eight questions are to be set, at least one question from each unit. Students will have to attempt five questions in all.
2. Use of non-programmable scientific calculator is allowed in Examination Hall.

**SYLLABUS
DIPLOMA IN AUTOMOBILE ENGINEERING
SEMESTER – II**

ENGINEERING DRAWING

Sub. Code: DCE 205

Credits: 02

Total Marks: 100

Minimum Pass Marks: 40%

Internal Assessment: 40 Marks

University Examination: 60 Marks

BLOCK I

Unit 1: Introduction

Application of Engineering Drawing in Engineering; Lettering and Dimensioning; Construction of Geometrical Figures like Pentagon; Hexagon etc.

Unit 2: Scales

Plain Scale; Diagonal Scale; Venier Scale.

Unit 3: Projections

First Angle and Third Angle Projections; Simple Projection of Points; Lines and Planes; Orthographic Projection of Simple Solids in Simple Positions.

Unit 4: Sections

Importance and Salient Features; Drawing of Full Section; Half Section; Partial or Broken Out Sections; Offset Sections; Revolved Sections and Removed Sections; Drawing of Different Conventions for Materials Intersection.

Unit 5: Isometric Projections

Principle of Isometric Projection; Isometric Projection using Box and Offset Method

Unit 6: Development of Surfaces

Development of Surfaces of Regular Solids like Pyramids and Prisms.

Suggested Readings:

1. Elementary Engineering Drawing, Bhatt N.D, Charoathar Publisher
2. A Text Book of Practical Geometry on Geometrical Drawing, Laxmi Narayan V & Vaish W, Pearson Education.
3. Design for manufacture, Cordett J, Dooner M, Meleka J and Pyn C, Addison Wesley.
4. The Engineering Design Process, Hawkes B and Abinett R, Longman.

Note:

1. Eight questions are to be set, at least one question from each unit. Students will have to attempt five questions in all.

2. Use of non-programmable scientific calculator is allowed in Examination Hall.

SYLLABUS
DIPLOMA IN AUTOMOBILE ENGINEERING
SEMESTER – III

MODELLING AND ANALYSIS OF HEAT TRANSFER

Sub. Code: DAE 310

Credits: 02

Total Marks: 100

Minimum Pass Marks: 40%

Internal Assessment: 40 Marks

University Examination: 60 Marks

BLOCK - I

UNIT – I : Heat Transfer Models

Heat Transfer models - mathematical formulation of heat transfer processes

UNIT –II : Exact Solutions

Exact solutions -Order of magnitude and dimensional analysis . Approximate analytical and numerical solutions.

UNIT – III : Introduction to Numerical Techniques

Introduction to Numerical Techniques -Finite difference, Finite Volume and Finite Elements Techniques.

UNIT – IV : Matrix Methods for Radiation

Matrix Methods for Radiation - Multimode problems.

Suggested Readings:

1. Modeling & Analysis of Heat Transfer by Ian Cameron,

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**SYLLABUS
DIPLOMA IN AUTOMOBILE ENGINEERING
SEMESTER – III**

MATERIAL SCIENCE

Sub. Code: DAE 320

Credits: 02

Total Marks: 100

Minimum Pass Marks: 40%

Internal Assessment: 40 Marks

University Examination: 60 Marks

BLOCK - I

UNIT – I : Structure of Metals

Structure of Metals - Ferrous Alloys Non Ferrous Metals and Alloys

UNIT – II : Heat Treatment

Heat Treatment of steel and surface heat treatment or case hardening - Toughening - Normalising - refining.

UNIT – III : Fluid Mechanics

Properties of fluids - flow of fluids - Flow of fluids in closed conduits .

UNIT – IV : Reciprocating Pumps

Reciprocating pumps - Centrifugal pump - Hydraulic systems.

UNIT – V : Lab Exercises

The laboratory course will comprise of exercises on what is learnt in the theory classes of the same course

Suggested Readings:

1. Material Science by Vijaya

Note:

1. Eight questions are to be set, at least one question from each unit. Students will have to attempt five questions in all.
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SYLLABUS
DIPLOMA IN AUTOMOBILE ENGINEERING
SEMESTER – III

PRODUCTION TECHNOLOGY

Sub. Code: DAE 330

Credits: 02

Total Marks: 100

Minimum Pass Marks: 40%

Internal Assessment: 40 Marks

University Examination: 60 Marks

BLOCK - I

UNIT – I : Casting

Classification of Casting processes : according to mold material , moulding materials and special techniques . Fettling and Finishing of castings - Defects in casting.

UNIT – II : Welding

Welding: Classification of welding processes - principles of Gas welding, arc welding, resistance welding, solid state welding, thermo chemical welding and radiant energy welding - Brazing and Soldering - Welding of Gray CI, carbon steels, stainless steel, aluminum, copper and their alloys - thermal cutting of metals/alloys.

UNIT – III : Metal Forming I

Metal Forming I : Forging : Classification of forging processes - forging equipment - powder metallurgy .Rolling : Classification of rolling processes - rolling mill - rolling of bars and shapes .Extrusion : Classification of extrusion processes - extrusion principle - example.

UNIT – IV : Metal Forming II

Metal Forming II : Drawing : Drawing of rods , wires and tubes .Sheet metal forming methods ,Shearing , Blanking , Bending , Stretch Forming , deep forming .Spinning : Spinning processes.

UNIT – IV : High Velocity Forming and Plastics Working

High Velocity Forming and Plastics Working : High Velocity Forming : Explosive forming , Electro hydraulic forming - magnetic pulse forming - pneumatic - mechanical high velocity forming. Plastics Working : Principles of : Compression molding , Transfer Molding , Injection Molding , Rotational molding , Blow molding , Fabrication of plastics , Reinforced plastics , Laminated plastics , Joining of plastics . Compounding and performing , Extrusion , Spreading , Casting , Thermoforming , Calendaring.

UNIT – V : Lab Exercises

The laboratory course will comprise of exercises on what is learnt in the theory classes of the same course

Suggested Readings:

1. Production Technology by Elanchezhian C.

Note:

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2. Use of non-programmable scientific calculator is allowed in Examination Hall.

**SYLLABUS
DIPLOMA IN AUTOMOBILE ENGINEERING
SEMESTER – III**

UTILIZATION OF SOLAR ENERGY

Sub. Code: DAE 340

Credits: 02

Total Marks: 100

Minimum Pass Marks: 40%

Internal Assessment: 40 Marks

University Examination: 60 Marks

BLOCK - I

UNIT – I : Structure

Structure of the sun, Sun-Earth relationships; Solar radiation

UNIT – II : Measurements & Estimation

Measurements and estimation; Availability and limitations of solar energy;

UNIT – III : Effects & Applications

Flat plat collectors; Energy balance; heat capacity effects; selective coating; Solar energy applications;

UNIT – IV : Storage & Power Generation

Water heating, cooling, dehumidification, drying, solar stills; Energy storage and solar ponds.
Focussing collectors. Thermal power generation.

Suggested Readings:

1. Utilization of Solar Energy by United Nations Industrial Development Organization.

Note:

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2. Use of non-programmable scientific calculator is allowed in Examination Hall.