

Curriculum for Undergraduate Degree (B.VOC) in Automotive Manufacturing Technology (w.e.f. AY: 2021-22)

Part II: Detailed Curriculum

SECOND SEMESTER

THEORY

Paper: Basic Electronics

Code: BAMV201

Credits: 3

Course Contents:

i) Overview of Atom, Sub-Atomic Particles and CRO

- Brief History of Electronics.
- Atom and its elements,
- Electron, Force, Field intensity, Potential, Energy, current
- Electric field, Magnetic field, Motion of charged particles in electric and magnetic field.
- Overview of CRO, Electronic and Magnetic deflection in CRO, Applications.

ii) Voltage and Current

- Resistance, Ohm's law, V-I Characteristics, Resistors, Capacitors, Inductors.
- Voltage and Current sources, Symbols and Graphical representation
- Overview of AC, DC, Cells and Batteries, Energy and Power.

iii) Basics of Semiconductor

- Semiconductor materials, Metals and Semiconductors and Photo-electric emission.
- N-type and P-type semiconductor, Effects of temperature on Conductivity of semiconductor.
- PN junction diode, depletion layer, Forward & Reverse bias, V-I Characteristic, Effects of temperature, Zener diode, Photo diode, LED, Types and applications of diode.
- Diode as a rectifier, Half wave and full wave rectification, Zener diode Regulator.
- Introduction to Filters, Clippers, Clampers

iv) Bipolar Junction Transistor

- Operation of NPN and PNP transistors, Biasing of BJT.
- CB, CE and CC configuration
- Introduction to FET, JFET, MOSFET, CMOS and VMOS

v) Transistor Amplifier and Applications

- Introduction, Single and Multi-stage amplifiers

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- Introduction to Oscillators
 - Introduction to Thyristors, PNP diode, SCR, LASCR, DIAC, TRIAC

Reference Books:

1. Basic Electronics, S. Biswas, Khanna Publishing House
2. All in One Electronics Simplified, A.K. Maini, Khanna Publishing House

Paper: Material Science and Material

Code: BAMV202

Credits: 3

Course Contents:

UNIT 1

GENERAL: Brief introduction to the subject metallurgy and its scope in engineering field, classification of materials of industrial importance. Their chemical thermal, electrical, magnetic, mechanical and technological properties and their selection criteria for use in industry

STRUCTURE OF METALS AND THEIR DEFORMATION:

Structure of metals and its relation to their physical, mechanical and technological properties, Elementary idea of arrangement of atoms in metals, molecular structures, crystal structures and crystal imperfections, Deformation of metals, effects of cold and hot working operations over them. Recovery re-crystallisation and grain growth, solid solutions, alloys and inter metallic compounds, effect of grain size on properties of metals.

PROPERTIES AND USAGE OF: (1) Metals: (a) Ferrous Metals (b) Non Ferrous Metals (2) Non-metallic Materials.

UNIT 2: METALS-FERROUS METALS

(a) Classification of iron and steel. (b) Cast iron types as per I.S. - White, malleable, Grey (c) Steels: Classification of steels according to carbon content and according to use as per I.S. Mechanical properties of various steels and their uses. Availability of steel in market, Its forms and specifications (d) Alloy Steel: Effect of alloying various elements, viz Cr, Ni, Co, V, W, Mo, Si, and Mn, on mechanical properties of steel, Common alloy steels, viz, Ni-steel, Ni-Cr-steel, Tungsten steel, Cobalt steel, Stainless Steel, Tool steel- High Carbon Steel, High Speed steel, Tungsten Carbide, Silicon manganese steel, Spring Steel, Heat Resisting alloy Steels etc.

UNIT 3: NON-METALIC MATERIALS

(a) Plastic and Other Synthetic Materials: Plastics-Important sources-Natural and Synthetic, Classification, thermo-set and thermoplastic, Various trade names, Important Properties and engineering use of plastics. Market forms of Plastics (b) Paints, Enamels, Varnishes and Lacquers: Paints and Enamels-types, its purpose, essential ingredients and their role, characteristics of a good paints and enamel, trade names of some important types of products. Varnishes-types purpose of varnish, essential ingredients and their role,

characteristics, preparation, trade names storage of varnish, Lacquer- characteristics, preparation and uses

UNIT 4: NON-METALIC MATERIALS

(c) Heat Insulating Materials: Classification of Heat Insulating material, properties and uses of China clay, Cork, Slag wool, Glass Wool, Thermocol, Puff, Properties and uses of asbestos as filler material. (d) Hardware: General specification, uses and methods of storage of G.I. and C.I. steel, Copper, A.C. pressure conduits, R.C.C. spun, P.V.C. Pipes and their uses. General sheets specification (I.S.) and uses, Method of storage of G.I. sheets, M.S. sheets, General specification of pipe fitting

UNIT 5

IDENTIFICATION AND TESTING OF METAL ALLOYS: Selection, specification forms and availability of materials.

HEAT TREATMENT OF METALS: Elementary concept, purpose, Iron-carbon equilibrium diagram. T.T.T. and 'S' curve in steels and its significance, Hardening, Tempering, Annealing, Normalising and case hardening.

Paper: Motor Vehicle Technology-II

Code: BAMV 203

Credits: 3

Course Contents:

UNIT 1: FRAME AND BODY

Function and construction of frame. Cross-section of frames. Unitized construction (monocoque) types of bodies. Terms - Turning radius, lock-to-lock angle, centre point steering, positive steering, gradeability. Idea of Safety features in a modern car.

UNIT 2: SUSPENSION SYSTEM

Function. Types - conventional and independent. Spring types - coil, leaf - elliptical, semielliptical; helper springs, transverse springs. Spring camber; spring material. Torsion bar, stabiliser bar. Shock absorbers- telescopic and gas. Maruti suspension system and shockers. Anti-roll bars. Nitrox suspension.

UNIT 3: STEERING SYSTEM AND FRONT AXLE

Principle - Ackermann and Davis. Function, requirements, Steering gear box - types. Construction and working details of worm and sector, rack and pinion, worm and wheel, worm and recirculating ball type. Tractor steering. Power steering. Electronic Steering. Front axle - rigid front axle. Stub axle. Elliot and reverse elliot type. Lemoine and reverse lemoine type. Tractor front axle. Maruti steering system. Wheel alignment - castor angle, camber angle, K.P.I., Toe-in, toe out. General values of these.

UNIT 4: BRAKING SYSTEM

Braking terms - braking efficiency, stopping distance, stopping time, weight transfer during braking, leading/trailing shoe of brake. Determination of braking torque. Effect of braking on steering. Types of braking systems- constructional details and working of mechanical

brakes, hydraulic brakes, parking brake, vacuum, pneumatic, air-hydraulic brakes; tractor brakes. Drum and disc brakes. Master cylinder, tandem master cylinder, wheel cylinder. Brake lining and brake fluid. Brake defects, their causes and remedies. Anti-Lock Braking System (ABS) & Electronic Brake Distribution (EBD).

UNIT 5: AUTOMOBILE POLLUTION AND ITS CONTROL

Effects and extent of pollution caused due to stationary and automobile engines. Harmful products and their causes in petrol & diesel engines. Measures to control exhaust emissions from two-stroke engines, four-stroke engines, and diesel engines. Turbocharger. Products which cause de-activation of catalysts in catalytic converters. Unleaded petrol. Emission measuring instruments for petrol and diesel engines. Limits specified in Motor Vehicles Act. Recent trends in Automobile Pollution Control-Exhaust Gas Recirculation. Air Injection, Reactor System. Positive Crankcase Ventilation. Evaporative Emission Control System.

Reference Books:

1. Automobile Mechanics, A.K. Babu, S.C. Sharma, T.R. Banga, Khanna Publishing House.

Paper: Two and Three Wheeler

Code: BAMV204

Credits: 3

Course Contents:

Unit I: The Power Unit

Two stroke and four stroke SI & CI engine Construction and Working, merits and demerits, Symmetrical and unsymmetrical valve & port timing diagrams, scavenging process

Unit II: Fuel and Ignition Systems

Fuel system – Different circuits in two wheeler fuel systems, fuel injection system. Lubrication system, Ignition systems - Magneto coil and battery coil spark ignition system, Electronic ignition System, Starting system - Kick starter system – Self-starter system, Recent technologies

Unit III: Chassis and Sub-Systems

Main frame for two and three wheelers, its types, Chassis and different drive systems for Two wheelers, Single, multiple plates and centrifugal clutches, Gear box and its and various gear controls in two wheelers. Front and rear suspension systems, Shock absorbers, Panel meters and controls on handle bar, Freewheeling devices

Unit IV: Brakes and Wheels

Drum brakes & Disc brakes Construction and Working and its Types, Front and Rear brake links layouts. Brake actuation mechanism. Spoked wheel, cast wheel, Disc wheel & its merits and demerits. Tyres and tubes Construction & its Types. Steering geometry

Unit V: Two & Three Wheelers – Case Study



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Case study of Sports bike, Motor cycles, Scooters and Mopeds - Auto rickshaws, Pick up van, Delivery van and Trailer, Servicing and maintenance, recent developments

SECOND SEMESTER **PRACTICAL**

Paper: Mechanical Workshop Practice

Code: BAMP201

Credits: 1.5

Course Contents:

1. Welding Shop Work

Exp-1: Welding practice-gas and electric

Exp-2: Welding for lap joint after preparing the edge

Exp-3: Welding for Butt joint after preparation of the edge

Exp-4: `T' joint welding after preparation of edge.

2. Machine Shop:

Exp 1: Make a specific Job by mild steel in a lathe

Exp 2: Make a specific job by Shaping and milling machine

3. Fitting

(i) Drill a hole in MS Block & tapping the same (ii) Making a Bolt & Nut by Tap & Die set. (iii) Utility article-screw driver, Paper weight.

4. Smithy

(i) To make square or hexagonal head bolt (ii) To make ring with hook (iii) Utility article-to prepare a fan hook.

5. Tin Smithy, Soldering, Brazing

(i) To prepare different types of joint such as lap joint single seam, double seam & cap joint & wired edge. (ii) Utility article-waste paper basket or paper tray (iii) Study & sketch stakes/ anvils.

Paper: Automobile Workshop

Code: BAMP202

Credits: 1.5

Course Contents:

UNIT-I: Engine tuning: Meaning and scope of engine tuning. Necessity of engine tuning, Service data of Maruti: Alto, Wagon R, Swift (Petrol & Diesel); Hyundai: Santro, Ford:



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Fig; Volkswagen: Polo; Chevrolet: Spark. Engine analysis and tuning with the help of diagnostic computer, Diesel engine injection timing checking

UNIT-II: Wheel Balance: Reasons of wheel imbalance, Effect of wheel imbalance on stability of vehicle. Static and dynamic balancing, Wheel balancing by the application of weights, Wheel Alignment: Meaning of wheel alignment, Various angles-camber, caster, KPI & toe - and their effect on steering stability, General values of popular Indian vehicles, Wheel alignment on computerized wheel aligner.

UNIT-III: Measurement of Exhaust Pollution by various analyzers such as Four Gas Analyzer, Smoke meter, NOx analyser

UNIT-IV: Use of Headlight aligner, Wheel aligner, automotive oscilloscope

UNIT-V: Servicing: Meaning and scope of servicing, Items attended to in servicing of a vehicle. Servicing a vehicle, Focusing and alignment of head lights

Reference Books:

1. Engine Service: Gary Lewis
2. Various Car's Manuals

Paper: Project

Code: BAMP203

Credits: 3

Course Contents:

On the basis of learning from semester end training, a project to be taken up by the student strengthening his/ her vocational skills.