Curriculum for Undergraduate Degree (B.VOC) in Automobile Servicing (w.e.f. AY: 2021-22)

Part II: Detailed Curriculum

FIFTH SEMESTER
THEORY

Paper: Entrepreneurship
Code: BAS 501
Credits: 3

Course Contents:

1. Entrepreneurship and entrepreneur:
Need of Employment and Opportunities, Essential Characteristics of a good Entrepreneur, Industrial Policy, Classification of industries- Micro, small scale , Medium scale, Large scale, Type of industries- Production, Job based & Service
2. Entrepreneurial Development:
Product identification/ selection, Site selection, Plant layout, Institutional support needed, Pre-market survey.
3. Entrepreneurship Support System and Start-ups:
Introduction to start-up's, Role of District Industries Centre in setting up industry, Function of NSIC, SISI, NISIET, NRDC, SSIC, SIDO, NMTC, KVIC, RSMML, Role of state finance corporation, state electricity corporations, pollution control board, BIS, I.S.O. etc.
4. Introduction to Tax System, Insurance and Acts:
Idea of income tax, sales tax, excise duty and custom duty, Industrial and fire insurance, procedure for industrial insurance, Introduction to Industrial acts, factory act, Workmen's compensation act 1923, Apprentices act 1961, Environmental protection act 1986
5. Project Report Preparation:
Procedure of preparing a project report, Format of project report, Preparation of project report, Introduction to ISO: 9000 Series of Quality System

Paper: Automotive System Design
Code: BAS 502
Credits: 3

Course Contents:

Unit-I: Design of Clutches & Gearbox: Design requirements of friction clutches, selection criterion, torque transmission capacity, lining materials, Design of single plate clutch, multi-plate clutch and centrifugal clutch. Selection of gear ratios and final drive ratio, numerical on 3- speed and 4- speed gearbox.

Unit-II: Design of Propeller Shafts and Axles: Design of propeller shafts for bending, torsion and rigidity, Design of universal joints and slip joints, final drive, Design of live and dead axles.

Unit-III: Brake Systems: Design of hydraulic braking system, internal expanding shoe brake and disc brake, design of master and wheel cylinder and piping design.

Unit-IV: Design of Suspension and Steering System: General design considerations of suspension system, design of helical and leaf springs for automobile suspension system, design considerations of belleville springs, elastomeric springs, design considerations of steering system and vehicle frame design.

Unit-V: Statistical Consideration in Design and Optimization: Ergonomics and aesthetic design, statistics in design, design for natural tolerances, statistical analysis, and mechanical reliability, introduction to design optimization of mechanical elements, adequate and optimum design, methods of optimization, johnson's method of optimum design-simple problems in optimum design like axially loaded members.

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

Paper: Garage Organization & Transport Management
Code: BAS 503
Credits: 3

Course Contents:

UNIT 1: LAYOUT OF GARAGE AND TOOLS & EQUIPMENT REQUIRED

Location of modern automobile garage. Layout of a fully equipped modern garage. Major equipment used in repair, testing, and reconditioning of automobiles. Service Station equipment (compressor, washer, hydraulic ramp and other lifting devices etc.) Denting and painting tools and equipment. Layout of fuel filling station-cum-service station. Workshop safety.

UNIT 2: GARAGE PROCEDURE

A typical garage organisation chart. Duties of garage foreman. Vehicle selling- dealership, showroom, Terms of Warranty, after-sales service, advertising, and salesmanship. Diagnosing and estimating repairs. Booking of repairs. Job card, time card. Inspection and testing of repaired vehicles. Billing of repairs. Customer record. Purchase and sale of used vehicles. Insurance and accidental jobs. Safety in garages. Customer satisfaction. Time management.

UNIT 3: STORE ORGANISATION

Stores and store-keeping procedure. Day book, ledger, stock register. Indenting and issue of spares and materials. Inventory control. Stocking of material - shelves, racks, bins; fuels and inflammable materials. Handling of liquids and acids. Duties and responsibilities of store- keeper and purchase officer. Tools-Storing and issuing.

UNIT 4: FLEET MANAGEMENT

Types of vehicles in a fleet - goods vehicles, tankers and carriers, delivery vans, fire fighting vehicles, break-down service vehicles, buses and luxury vehicles. Layout of a fleet maintenance depot, Duties of driver, conductor and mechanic, Scheduling the maintenance of a fleet. Estimating the operating cost of transport vehicles

UNIT 5: MOTOR VEHICLE ACT

Definition of vehicles, testing and certifying procedures, Registration of vehicles, Permits for passenger and goods vehicles, Licensing, Transfer of ownership. Essentials of driving and traffic regulations; signals and traffic signs

Reference Books:

Fleet Maintenance & Management: AW Clair

Paper: Automobile Electrical and Electronics System
Code: BAS 504
Credits: 3

Course Contents:

UNIT 1: STARTING SYSTEM

Principle, construction and working of starter motor. Series motor and its characteristics, Compound wound motor, Engine starting circuit, Starter drives-Bendix (torsion, compression), over-running clutch and sliding armature types. Starter switch - manual, solenoid, Factors affecting the starting of engines, Torque terms. Starting torque and power required, Motor efficiency, Armature reaction, Typical motor specifications

UNIT 2: IGNITION SYSTEM OF SPARK-IGNITED ENGINES

Types of ignition systems- battery-and-coil, magneto ignition systems. Ignition circuit. Details of the ignition system-ignition coil, distributor, condenser, contact breaker points, rotor, distributor cap, distributor drive. Firing order. Ignition timing. Ignition advance and retard, need, and factors it depends upon. Methods for obtaining advance and retard vacuum and mechanical. Optical sensor for spark timing.

UNIT 3

Spark plugs-constructional details; types used in automobiles, conditions of working of spark plugs. Glow plugs of diesel engines. Magneto-rotating armature and rotating magnet types. Electronic ignition of cars & motor-cycles (CDI), Idea of Distributor-less Direct ignition system.

UNIT 4: LIGHTING SYSTEM

Requirements of automobile lighting. Head lamp - mounting and construction; Plastic headlamp Lens, sealed beam assembly. Asymmetrical head light, dipper and full beam, care of headlamp, Lens cleaners. Dynamic headlight beam control, Advanced Front lighting system (AFS) Types of bulbs. Reflector optics. Light sources – tungsten light Sources, tungsten halogen light sources, halogen infra-red reflective light sources, HID light sources (Xenon and bi-xenon), LED light sources, Blue vision head lamp. Auxillary lights, Brake light, Fog light, Flasher unit, warning lights and panel lights.

UNIT 5: ACCESSORIES

Fuel and oil pressure gauge, cooling water temperature gauge, electrical speedometer, amperemeter, wind-screen wiper, electrical horn and relay, cigarette lighter, Odometer, wind-shield washing equipment, engine

rpm meter, glow plug indicator, cluster assembly. Radio and television Interference suppressors, electrical switches. Central locking of doors, power winding of window panes, car heaters AC, blower and air flow controls, Rear defogger.

Reference Books:

1. Automotive Engines, A.K. Babu, Khanna Publishing House

Paper: Auto Body Repair, Denting & Painting
Code: BAS 505
Credits: 3

Course Contents:

Safety precautions and first aid, Proper use, care and maintenance of tools and equipments. Introduction on types, function of body and panels, Procedure for inspection, removing and refitting of body components panels, doors and other body parts, Arc welding-basic electricity and welding power source. Electrodes types, description and specification.arc welding procedure Gas welding-gas welding, brazing and soldering procedures Description of gas cutting, Resistance welding-resistance welding, process-spot, seam and butt welding Details of MIG welding, Method of fixation of wind screen, glass Procedure for cut open, beat out, dents, stripping of old paints, sanding at different stages, smooth surface preparation at different stages, putty application &primer application at different stages of affected area(chronological order for repair of auto body)fitment of repaired part and aligning to the original shape.

Personal safety – three key areas of risk eyes, skin and inhalation. Details of personal protective, equipments-RPE,PPE Details of ingredients of paint, Procedure of refinishing process, Selection of consumable for doing painting work Procedure for doing painting(in chronological order),selection of materials, tools and equipments application of body filler for surface preparation, sanding on the affected area for smooth surface preparation, primer coating on the affected area, preparing affected surfaces for base coating, applying Base coat painting, clear coat painting for metallic paints, rubbing and polishing, Application of paint production, treatment/anti rust treatment Procedure for inspection of painting, work and fixing the wind screen glass Details of spray gun-types-standard air, gap design-different sizes of nozzles, Details of different types sanding - 15 equipments Different types of sand paper-grades, Possible defects in painting, objects, causes and its cure

FIFTH SEMESTER
PRACTICAL

Paper: Automobile Workshop-II
Code: BAS 591
Credits: 3

1. Find the mechanical efficiency of a multi-cylinder engine by Morse Test
2. Tune a multi-cylinder petrol engine and set dwell, rpm, ignition timing, CB point gap, spark plug gap, and tappet clearance.
3. Check the condition of the given battery as regards: (i) cell voltage (ii) specific gravity (iii) ampere-hour capacity (iv) Level of electrolyte. Use battery capacity tester. Clean the battery and charge it. Prepare a maintenance schedule.
4. Dismantle study, assemble and check for proper working the following: (a) Electric horn (b) Wiper motor (c) Starter motor (d) dynamo (e) alternator.
5. Test the following on electrical test bench: (a) Dynamo (b) Starter motor (c) Alternator. Also study the working of a growler.
6. Dismantle, inspect and assemble the magneto of a 2-wheeler. Set the ignition timing using dial gauge. 7. Dismantle and assemble the given electrical fuel pump. Check it for proper working.
8. Set the cut-out and regulator of a vehicle.
9. Dismantle, study, and re-assemble multi-cylinder F.I. pump.
10. Test a multi-cylinder F.I. pump on calibrating machine and check it for proper phasing. Set the injection timing on the engine.
11. Test a diesel fuel injector and set injection pressure. Grind needle and seat.
12. Study and sketch rotary F.I. pump.
13. Study of working of electric vehicle.
14. Study and sketch the Electrical Wiring System of a Car.
15. Diagnostic Trouble Codes, ECM Power and Ground Circuit Check, All Engine Management system Sensor Circuit, Like MAP, CPS, VSS etc. Circuit Check, Fuel Pressure Check, Fuel Injection Circuit Check, Evaporative Emission Control system Check, Inspection of ECM & its Control, Check All solenoids.

Paper: Auto Body Repair, Denting & Painting Workshop
Code: BAS 592
Credits: 3

AUTO BODY REPAIR Practice health & safety-familiarize, select, proper use, maintain and store – tools, equipments, Consumables clothing safety Simple basic practices on computer reading, service manuals, collision repair manuals and colour matching guide, Identification of different types of body, chassis and drive lines, Identification of location of parts and panels, Practice on operating the air compressor, Practice on periodical maintenance of air compressor Inspect and decide whether it can be repaired or replaced Remove and refit body panels, doors, floors, wheel boxes and fenders Practice on removing and refitting wind shield glasses Practice on arc welding on vehicle body Practice on gas welding, gas brazing, gas soldering and gas cutting on vehicle body Practice on resistance, spot, seam and butt welding on vehicle body Practice on MIG welding Safety precautions and first aid. Proper

use, care and maintenance of tools and equipments, Introduction on types, function of body and panels Procedure for inspection, removing and refitting of body components panels, doors and other

body parts Arc welding-basic electricity and welding power source. Electrodes types, description and specification, Arc welding procedure Gas welding-gas welding, brazing and soldering procedures Description of gas cutting Resistance welding-resistance welding process-spot, seam and butt welding Details of MIG welding Method of fixation of wind screen glass Procedure for cut open, beat out

dents, stripping of old paints, sanding at different stages, smooth surface preparation at different stages, putty application &primer application at different stages of affected area(chronological order for repair of auto body)fitment of repaired part and aligning to the original shape, Practice on plasma welding, Practice on minor repair of auto body cut open, beat out, strip out old paint, make smooth surface by using different grades of sanders, apply putty on affected area and applying primer(repair damaged body which is ready for final paint) Apply base coat painting, Fit check the repaired components for alignment

AUTO BODY PAINTING Practice health & safety-familiarize, select, proper use, maintain and store – tools, equipments, Consumables clothing safety, Practice on removing paint from the damaged area Practice on mixing and applying body filler Practice on sanding(block) Practice on mixing and applying putty Practice on applying primer Practice on feather edge sanding and masking Base coat application Surface cleaning and degreasing Second and third coat application Preheating the vehicle and cooling Cutting, scuffing, rubbing and polishing