

Punyashlok Ahilyadevi Holkar Solapur University, Solapur



NAAC Accredited-2015, 'B' Grade (CGPA 2.62)

Board of Studies in Automobile Servicing

Credit System Pattern Syllabus (CBCS)

For

B. Voc. Part-I (Diploma)

Diploma in Automobile Servicing

(To be implemented from the Academic Year: 2019-20)

BACHELOR OF VOCATION (B.Voc.)

STRUCTURE OF SYLLABUS:

To be implemented from the academic year 2019-20

1. Title of the course: Bachelor of Vocation (Automobile Servicing)

A. INTRODUCTION

The proposed curriculum is with the view to make it more contextual, industry affable and suitable to cater the needs of society and nation in present day context. The committee examined the nature of the existing syllabus of various courses in Automobile Servicing and after analyzing other curricula of existing universities in respective subjects in terms of content, relevance, quality and pattern of teaching and examination, has synthesized the present proposal. After guidance from senior faculty, feedbacks from the core faculty and intensive discussions the syllabus is suitably finalized.

A holistic approach is followed for providing industry training via on job training/internships, handling live projects, visits to Automobile related industries. Regular expert's interaction will help to build a bridge between students and industry.

Technical advancement is the key to a substantial teaching system in today's world and thus a great responsibility lies on the curriculum to prepare students to rise to meet global standards and align seamlessly to changing trends.

B. COURSE OBJECTIVES

After successfully completing the vocational course, the student should be able to acquire relevant appropriate and adequate technical knowledge together with the professional skills and competencies in the field of Automobile Servicing so that he/she is properly equipped to take up gainful employment in this Vocation. Thus he/she should have acquired.

1. Understanding of

- (a) The relevant basic concepts and principles in basic science subjects so that the students is able to understand the different vocational subjects.
- (b) The basic concepts in engineering drawing.
- (c) The concepts, principles and procedures used Automobile Servicing.
- (d) The knowledge of working of Automobile components.
- (e) The procedure of replacing / installing Automobile Components.
- (f) The concepts and principles used in Hybrid Automobiles.

2. Adequate Professional Skills and Competencies in

- A. Providing Service to the two-wheeler, three-wheeler, four-wheeler and SUVs.
- B. Testing the performance of Automobile components.
- C. Locating the fault at component level and at the stage level.
- D. Providing Service and repair to the Hybrid Automobiles.

3. A Healthy and Professional Attitude so that He/She has

- A. An analytical approach while working on a job.
- B. An open mind while locating/rectifying faults.
- C. Respect for working with their own hands.
- D. Respect for honesty, punctuality and truthfulness

4. NSQF compliant skills in Qualification developed by sector skill council in Automotive sector or Capital Goods Sector pertaining to Automobile Service and Repair

D. DURATION:

The duration of the B.Voc. Course will be of **three years** with flexibility to the students by means of pre-defined entry and multiple exit points. The certification levels will lead to Diploma/Advanced Diploma/B. Voc. Degree in Refrigeration and Air Conditioning and will be offered by respective affiliating University. Award of certificates after successful completion of respective years is as follows:

- ❖ **B.Voc. Part I - Diploma in Automobile Servicing**
- ❖ **B.Voc. Part II - Advanced Diploma in Automobile Servicing**
- ❖ **B.Voc. Part III - Bachelor of Vocation in Automobile Servicing**

Awards		Normal calendar duration	On Job Training (OJT)/ Qualification Packs(QP) Credits	Theory & Practical/Lab Credits
Year 1	Diploma in Automobile Servicing	Two Semesters	30	30
Year 2	Advanced Diploma in Automobile Servicing	Four Semesters	30	30
Year 3	B. Voc. in Automobile Servicing	Six Semesters	30	30
TOTAL			90	90

B. Voc. Part - I (Automobile Servicing) Course structure

Credit System Structure of B.Voc. Part I - Diploma in Automobile Servicing
w.e.f. 2019-20

Semester I

Theory Course

Course Code	Name of Theory Course	Hrs./Week		Credits	Examination Scheme (Marks)		
		L	P		ISE	ESE	Total
5.GV.01	Communication skills	3	-	3	20	30	50
5.GV.02	Applied science	3	-	3	20	30	50
5.GV.03	Material Science and Metallurgy	3	-	3	20	30	50
5.GV.04	Motor Vehicle Technology-I	3	-	3	20	30	50
Sub Total		12	-	12	80	120	200

Lab / Practical Course

Course Code	Name of Theory Course	Hrs./Week		Credits	Examination Scheme (Marks)	
		L	P		ICA	Total
5.VP.01	Metrology and Measuring Instruments Lab	-	3	1.5	50	50
5.VP.02	Mechanical Workshop Practice	-	3	1.5	50	50
Sub Total		-	6	3	100	100

On-Job-Training (OJT)/Qualification Packs

Course Code	Name of Theory Course		Hrs./Week		Credits	Examination Scheme (Marks)	
			L	P		ICA	Total
ASC/Q 1403	Automotive Service Technician Level 5	(Any one)	5	20	15	200	200
ASC/Q 1502	Spare Parts Operations Executive Level 5						
ASC/Q6401	Industrial Engineer (Layout Design)						
ASC/Q4001	Tool Designer						
ASC/Q 6405	Equipment Designer Level 5						
Sub Total		-	5	20	15	200	200
Grand Total			17	26	30	500	500

Abbreviations: L: Lectures, P: Practical, ESE: End Semester Examination (University Examination for Theory), ICA: Internal Continuous Assessment

Theory Course

Course Code	Name of Theory Course	Hrs./Week		Credits	Examination Scheme (Marks)		
		L	P		ISE	ESE	Total
5.GV.05	Basic Electrical & Electronics	3	-	3	20	30	50
5.GV.06	Manufacturing Technology	3	-	3	20	30	50
5.GV.07	Automobile Electrical Equipment	3	-	3	20	30	50
5.GV.08	Motor Vehicle Technology-II	3	-	3	20	30	50
Sub Total		12	-	12	80	120	200

Lab / Practical Course

Course Code	Name of Theory Course	Hrs./Week		Credits	Examination Scheme (Marks)	
		L	P		ICA	Total
5.VP.03	Project	-	6	3	100	100
Sub Total		-	6	3	100	100

On-Job-Training (OJT)/Qualification Packs

Course Code	Name of Theory Course		Hrs./Week		Credits	Examination Scheme (Marks)	
			L	P		ICA	Total
	One more QP to be opted from the QPs mentioned in the Level 5 first semester I	(Any one)	5	20	15	200	200
Sub Total		-	5	20	15	200	200
Grand Total			17	26	30	500	500

Abbreviations: L: Lectures, P: Practical, ESE: End Semester Examination (University Examination for Theory), ICA: Internal Continuous Assessment

(5.GV.01) Communication skills

Teaching Scheme: 3Hrs/Week

Examination Scheme:

ISE- 20 Marks

ESE- 30 Marks

Credit-3

Unit 01: English Grammar

Parts of Speech : Nouns, Pronouns, Verbs, Auxiliary verbs, Modal verbs, Adjectives, Adverbs, Prepositions, Conjunctions, Interjections, Articles.

Tenses:

Present and its Sub-types, Past and its Sub-types, Future and its Sub-types.

Unit 02: Applied Grammar

Voice: Active and Passive

Degrees of Comparison: Positive, Comparative and Superlative, One of the

Speech: Direct and Indirect

Unit 03: Paragraph and Dialogue Writing

Paragraph and Dialogue Writing: Introduction, Guidelines for Paragraph Writing and Dialogue Writing

Types of Paragraph: Descriptive, Narrative, Technical, Comparison and Contrast Dialogue Writing

Unit 04: Vocabulary

Words often confused, Synonyms & antonyms Prefixes & suffixes.

Unit 05: Reading Comprehension

Reading comprehension

Text Books:

1. English Grammar & Composition , Wrenn& Martin, S. Chand
2. Technical English.Dr. M. Hemamalini. Wiley India Pvt.
3. English for Practical Purposes, Z. N. Patil, B.S. Valke, A.R. Thorat, Zeenath Merchant

Reference Books:

1. English Grammar Just for You. RajeevanKamal. Oxford University Press.
2. Practical English Usage . Michael Swan.OUP.1995.
3. Remedial English Grammar.F.T.Wood.Macmillan.2007.

(5.GV.02) Applied Science

Teaching Scheme: 3Hrs/Week

Examination Scheme:

ISE- 20 Marks

ESE- 30 Marks

Credit-3

1. Units & Dimensions: M.K.S. fundamentals & derived units, S.I. base units supplementary units and derived units, Dimensions of various physical quantities.

2. Heat: Temperature and its measurement, thermoelectric, platinum resistance thermometers and pyrometers. Basics of different modes of heat transfer.

3. Water:

Impurities in water, methods of their removal, hardness of water, its types, causes and removal, disadvantages of hard water in boilers, pH value and its determination by calorimetric method.

4. Corrosion:

Its meaning, theory of corrosion, prevention of corrosion by various methods using metallic and non-metallic coatings.

5. Fuel and their Classification:

Definition, characteristics, classification into solid, liquid and gaseous fuel,. Petroleum and brief idea of refining into various fractions and their characteristics and uses, Calorific value of fuel, Gaseous fuels- preparation, properties, composition and use of producer gas, water and oil gas.

6. Plastic and Polymers:

Plastic-thermo-plastic and thermo-setting, Introduction of Polythene. P.V.C. Nylon, synthetic rubber and phenol-formal-dehyde resin, their application in industry.

Text Books:

1. Chemistry, Satyaprakash, Khanna Publishing House
2. Engineering Chemistry, Saiful Islam, Khanna Publishing House
3. A Textbook of Engineering Physics, P.G. Kshirsagar and M. N. Avadhanulu

Reference Books:

1. Fundamentals of Physics, Resnick and Halliday

(5.GV.03) Material Science and Metallurgy

Teaching Scheme: 3Hrs/Week

Examination Scheme:

ISE- 20 Marks

ESE- 30 Marks

Credit-3

UNIT 1: Electrical Engineering Materials

Conducting Materials: Properties of good conducting materials, Types of materials used for electrification for appliances. Brief idea about conductivity & Resistivity

UNIT 2

(A) Insulating Materials: (a) Plastic insulating materials-definition and classification, thermo-setting and thermoplastic materials, their applications and commercial names & uses in industry. (b) Various insulating materials-mica asbestos, ceramic materials, glass, cotton, silk, jute, paper their properties and applications

(B) Semiconductor Materials: Characteristics and applications of semiconductor materials.

UNIT 3

(A) Non-Metallic Materials-Timber. Plywood, Hard Board, Batten Board, Plastic and Other Synthetic Materials. Paints, Enamels, Varnishes and Lacquers.

(B) Miscellaneous Materials: Important properties, characteristics and use of the following materials: Abrasives, Asbestos, Celluloid, Cork, Mica, Refractory.

UNIT 4: Mechanical Engineering Materials

(A) Ferrous and Non-Ferrous Metals, Mechanical, and electrical properties and use

(B) Concept of Alloying, Properties and applications

UNIT 5: Heat Treatment and Testing of Materials

(A) Heat treatment methods for different materials

(B) Testing Methods- Destructive and Non Destructive.

Text Books:

1. Engineering Materials: Dhanpat Rai & Sons
2. Electrical Engineering Materials: Madan Publishers
3. Material Science and Metallurgy: V. D. Kodgire, Everest Publishing House

Reference Books:

1. Engineering Mechanics, M.P. Poonia & D.S. Bedi, Khanna Publishing House
2. Civil Engineering Construction Materials, S.K. Sharma, Khanna Publishing House

(5.GV.04) Motor Vehicle Technology-I

Teaching Scheme: 3Hrs/Week

Examination Scheme:

ISE- 20 Marks

ESE- 30 Marks

Credit-3

Unit 1

Automobile Clutches

Clutches-Requirement ,functions, Types Single plate clutch, Multiplate clutch, Diaphragm clutches, Centrifugal clutches, Clutch components, Fluid coupling, Clutch specifications of some Indian automobiles.

Unit 2

Automobile Transmission

Necessity and function of transmission Types of gear boxes-Sliding mesh, Constant mesh and synchromesh gear boxes Epicyclic gear box, Overdrive unit, Transfer case, Torque converter Selector Mechanism for gear box, interlocking mechanism Specifications of transmission of some Indian automobiles.

Unit 3

Propeller shaft and Differential

Propeller shaft-function and construction Constant velocity joints,-Types Final drive and its types Differential-Necessity and types Rear axles-types

Unit 4

Wheels and Tyres

Wheels-Types (disc wheel, wired wheel and alloy wheel), Wheel dimensions Tyres-Conventional and Tubeless tyres, Tyre designations Factors affecting tyre life, Wheel and tyre data of some Indian Automobiles.

Unit 5

Transmission system trouble shooting

Clutch trouble shooting, Gear box trouble shooting, Propeller shaft trouble shooting, Rear axle trouble shooting, wheels and tyre trouble shooting.

Text Books:

1. Automobile Mechanics, A.K. Babu, S.C. Sharma, T.R. Banga, Khanna Publishing House.
2. Automobile Engineering, Dr. V.M. Domkundwar, Dhanpat Rai & Co.

Reference Books:

1. Automobile Engineering, Volume I, Dr. Kirpal Singh, Standard Publication.
2. Automobile Engineering, R.K. Rajput.

(5.VP.01) Metrology and Measuring Instruments lab.

**Teaching/Practical Scheme: 3Hrs/Week Examination Scheme:
ICA- 50 Marks
Credit-1.5**

1. Measurement of angle with the help of sine bar/ Vernier Bevel protractor.
2. Study of optical profile projectors.
3. Study and sketch of various types of comparators and use them for comparing length of given piece.
4. To measure the diameter of a hole with the help of precision balls.
5. To measure external and internal taper with the help of taper gauges, precision rollers.
6. To test the squareness of a component with auto-collimeter.
7. To measure the pitch, angle and form of thread of a screw.
8. To measure the geometry of a gear having involute profile.
9. To measure the straightness of the edge of a component with the help of auto- collimeter.
10. To measure the length, breadth, thickness, depth, height with micrometer.
11. To measure the length, breadth, thickness, depth, height, with height gauge and Vernier calipers.
12. Calibration of Vernier calipers/micrometers.
13. Calibration of height gauge/depth gauge.
14. Study of a tool maker's microscope.
15. Checking of accuracy of snap gauge with slop gauge.
16. Checking of accuracy of a plug gauge with micrometer.
17. Measurement of areas by polar planimeter.
18. Use of feeler, wire, radius and fillet gauges measurement of standard parameters.

Text Books:

1. Engineering Metrology, I.C.Gupta
2. Mechanical Measurement and Control ,Dr. D.S.Kumar

Reference Books:

1. Engineering Metrology, R.K.Jain
2. Mechanical Measurement, Soni and Dr. Radhakrishanan

(5.VP.02) Mechanical Workshop Practice

Teaching/Practical Scheme: 3Hrs/Week **Examination Scheme:**
ICA- 50 Marks
Credit-1.5

1. Carpentry Shop Work:

(EX-1) Planing and sawing practice, Making of lap joint

(EX-2) Making of mortise and tanon joint

(EX-3) (i) Bridle joint (ii) Dovetail joint (iii) Utility article like picture frame, larger peg, Name plate etc.

2. Sheet Metal Working and Soldering:

(EX-1) Cutting, shearing and bending of sheet.

(EX-2) To prepare a soap case by the metal sheet

(EX-3) To make a funnel with thin sheet and to solder the seam of the same

(EX-4) To make a cylinder and to solder the same

3. Fitting Shop Work:

(EX-1) Hack sawing , chipping of M.S. flat

(EX-2) Filing and squaring of chipped M.S. job

(EX-3) Drill a hole in MS Block & tapping the same

(EX-4)) Making a Bolt & Nut by Tap & Die set

4. Smithy Shop Work:

(EX-1) To prepare square angular piece by M.S. rod

(EX-2) To Braze M.S. flat/Tipped tool on M.S. shank

(EX-3) To make a screw driver with metallic handle

5. Welding Shop Work:

(EX-1) Welding practice gas & electric

(EX-2) Welding for lap joint after preparing the edge

(EX-3) Welding Butt joint after preparing the edge

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

Reference Books:

1. Workshop Technology, Vol. I: Hazra & Chaudhry.
2. Production Technology: P. C. Sharma

(5.GV.05) Basic Electrical & Electronics

Teaching Scheme: 3Hrs/Week

Examination Scheme:

ISE- 20 Marks

ESE- 30 Marks

Credit-3

1. Current Electricity

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, Relation between electrical, mechanical and thermal units.

2. D.C. Circuits & A.C. Circuits

Series – parallel resistance circuits, calculation of equivalent resistance, Kirchhoff's Laws and their applications. Generation of A.C. voltage, its generation and wave shape. Cycle, frequency, peak value R.M.S. value, form factor, crest factor, Phase difference, power and power factor, A.C. Series Circuits with (i) resistance and inductance (ii) resistance and capacitance and (iii) resistance inductance and capacitance.

3. Electromagnetic Effects

Permanent magnets and Electromagnets, their construction and use, Polarities of an electromagnet and rules for finding them. Faraday's Laws of Electromagnetic Induction, Dynamically induced e.m.f., its magnitude and induction, inductance and its unit. Mutually induced e.m.f., its magnitude and direction, Energy stored in an inductance.

4. 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.

5. Introduction to transistor

Introduction to BJT, Operation of NPN and PNP transistors

Introduction to FET, JFET, MOSFET, CMOS and VMOS

Text Books:

1. Basic Electrical Engineering, Ritu Sahdev, Khanna Publishing House
2. Basic Electrical Engineering, Pradeep Kumar, Khanna Publishing House
3. Basic Electronics, S. Biswas, Khanna Publishing House

Reference Books:

1. All in One Electronics Simplifies, A.K. Maini, Khanna Publishing House

(5.GV.06) Manufacturing Technology

Teaching Scheme: 3Hrs/Week

Examination Scheme:

ISE- 20 Marks

ESE- 30 Marks

Credit-3

Unit 1: General Process:

Classification of Manufacturing Processes i.e. Machining Process (Conventional & Non Conventional), Primary Manufacturing Process and its Types, Metal Joining Process, metal forming processes and Plastic Moulding.

Unit 2: Press Tool and operation:

Types of Press Tool: Blanking Operation, Piercing Operation, Cropping, Slitting, Coining, notching, Embossing, Parting off, Bending, Nibbing.

Unit 3: Metal Forming Process:

Forging & Its Types (Open Die Forging, Closed Die Forging, Upset Forging), Extrusion & Its Type (Forward & Backward Extrusion, Impact Extrusion & Hydrostatic Extrusion), Rolling, Types of Rolling Mills.

Unit 4: Metal Joining processes:

Classification of Welding Process i.e Arc Welding, Gas Welding, Resistance Welding, TIG & MIG Welding, Soldering & Brazing.

Text Books:

1. Workshop Technology, Vol. I: Hazra & Chaudhry
2. Workshop Technology, Vol. I: B.S. Raghuwanshi
3. Production Technology: P. C. Sharma

Reference Books:

1. Karyashala Takniki: J. K. Kapoor
2. Foundry Technology: P. L. Jain
3. Production Technology: P. N. Rao

(5.GV.07) Automobile Electrical Equipments

Teaching Scheme: 3Hrs/Week

Examination Scheme:

ISE- 20 Marks

ESE- 30 Marks

Credit-3

Unit 1: Automobile Wiring Systems

Earth-return and insulated-return systems; 6 Volt, 12 Volt and 24 Volt systems. Positive and negative earthing. Different types of cables used in automobiles- starting systems cables, general purpose cables and high- tension cables; cable specifications and colour coding. Wiring harness, cable connectors, plastic fibre-optic wires, printed circuits.

Unit 2: Storage Battery

Principle and constructional details of lead-acid battery, Electrolyte, Capacity of battery, Efficiency of battery, Methods of charging of battery. Cleaning of battery, Battery tests, VRLA batteries, Traction battery. Alkaline type batteries. Battery failures.

UNIT 3: Dynamo and regulators

Principle of generation of D.C. Constructional details of a Dynamo. Types of wound field generator- series, shunt and compound wound. Other types of D.C. generators-four brush & four pole, interpole, split field and bucking field. Dyna-Starter, Generator drive.

Principle of generation of A.C. Constructional details of an alternator. Working of alternators. Advantages over dynamo. Types of alternators.. Regulator for alternators. Constant current and constant voltage systems, Current-and-voltage regulator, Cut-out

UNIT 4: Lighting System

Requirements of automobile lighting. Head lamp construction; sealed beam assembly. Asymmetrical head light, dipper and full beam, 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.

Text Books:

1. Automotive Electricals and Electronics, A.K. Babu, Khanna Publishing House
2. Automotive Electrical Equipment: PL Kohli

Reference Books:

1. Modern Electrical Equipment: AW Judge
2. Automotive Electrical Equipment: WH Crouse

(5.GV.08) Motor Vehicle Technology - II

Teaching Scheme: 3Hrs/Week

Examination Scheme:

ISE- 20 Marks

ESE- 30 Marks

Credit-3

UNIT1: AUTOMOBILE CHASSIS

Automobile chassis and its components, Definitions of -wheel track, wheel base, front and rear overhang, kerb weight, ground clearance. Different layout of chassis -Front Engine Front wheel drive, Front engine rear wheel drive, Rear engine rear wheel drive and four wheel /all wheel drive,

UNIT2: AUTOMOBILE BODIES

Function and construction of frame. Cross-section of frames, Types of automobile frames, Types of automotive bodies, Unitized construction (monocoque), framed construction.

UNIT 3: SUSPENSION SYSTEM

Function. Types - conventional and independent suspension systems. Spring types - coil, leaf - elliptical, semi- elliptical; helper springs, transverse springs.. Torsion bar, stabiliser bar, Anti-roll bars. Shock absorbers- telescopic and gas. Nitrox suspension.

UNIT 4: STEERING SYSTEM AND FRONT AXLE

Principle - Ackermann and Davis. Function and requirements of automotive steering, steering system layout. Steering Geometry-caster angle, camber angle, K.P.I., Toe-in, toe out. Steering gear box - worm and sector, rack and pinion, worm and wheel, worm and recirculating ball type. Power steering. Electronic Steering. Front axle - rigid front axle. Stub axle. Elliot and reverse elliot type. Lemoine and reverse lemoine type. Wheel balancing and alignment.

UNIT 5: BRAKING SYSTEM

Braking terms - braking efficiency, stopping distance, stopping time, dynamic weight transfer, Types of braking systems- constructional details and working of mechanical brakes, Drum and disc brakes, leading/trailing shoes., parking brake, vacuum and pneumatic brakes. hydraulic brakes -Master cylinder, tandem master cylinder, wheel cylinder. Brake lining and brake fluid. Anti Lock Braking System (ABS) & Electronic Brake Distribution (EBD). Brake defects, their causes and remedies.

Text Books:

1. Automobile Mechanics, A.K. Babu, S.C. Sharma, T.R. Banga, Khanna Publishing House.
2. Automobile Engineering, Dr. V.M. Domkundwar, Dhanpat Rai & Co.

Reference Books:

1. Automobile Engineering, Volume I, Dr. Kirpal Singh, Standard Publication.
2. Automobile Engineering, R.K. Rajput.

(5.VP.03) Project

Practical Scheme: 6Hrs/Week

**Examination Scheme:
ICA- 100 Marks
Credit-3**

On the basis of learning in the vocational Course, a project to be taken up by the student strengthening his/ her vocational skills