

**SHIVAJI UNIVERSITY,  
KOLHAPUR**



“A<sup>++</sup>” Accredited by NAAC  
(2021) with CGPA 3.52

**Faculty of Interdisciplinary studies  
Structure, Scheme and Syllabus for  
Bachelor of Vocation (B. Voc.)**

## **Diploma in Automobile**

**Part I- Sem. I&II**

(Subject to the modifications that will be made from time to time)

Syllabus to be implemented from June, 2022-2023 onwards

As per National Education Policy 2020

## National Education Policy (NEP-2020)

### First Year Bachelor of Vocation (B.Voc.- Diploma in Automobile)

#### Course Structure for (Level-5)

**With Multiple Entry and Multiple Exit option  
(To be implemented from the Academic Year 2022-23)**

<b>Semester I – Duration: 6 Months (Certificate)</b>											
	<b>Teaching Scheme</b>					<b>Evaluation Scheme</b>					
Sr. No.	Course	No. of Lectures		Hours (T + P)	Credits	Theory	Internal/ Practical	Total Marks	Min Marks (Separate passing)	Exam Duration (Hrs.)	
		T	P							T	P
1.	AECC-A	4	2	6	4	40	10	50	18	2	-
2.	GEC-A	4	2	6	4	40	10	50	18	2	-
3.	DSC-A-I	4	-	4	4	50	-	50	18	2	-
4.	DSC-A-II	4	-	4	4	50	-	50	18	2	-
5.	DSC-A-III	4	-	4	4	50	-	50	18	2	-
6.	SEC-A-I	-	4	4	2	-	50	50	18	-	3
7.	SEC-A-II	-	4	4	2	-	50	50	18	-	3
8.	SEC-A-III	-	4	4	2	-	50	50	18	-	3
9.	SEC-A-IV	-	-	2	2	-	50	50	18	-	-
<b>Total</b>		20	16	38	28	230	220	450	-	-	

<b>Semester II – Duration: 6 Months (Diploma)</b>											
	<b>Teaching Scheme</b>					<b>Evaluation Scheme</b>					
Sr. No.	Course	No. of Lectures		Hours (T + P)	Credits	Theory	Internal/ Practical	Total Marks	Min Marks (Separate passing)	Exam Duration (Hrs.)	
		T	P							T	P
1.	AECC-B	4	2	6	4	40	10	50	18	2	-
2.	GEC-B	4	2	6	4	40	10	50	18	2	-
3.	DSC-B-I	4	-	4	4	50	-	50	18	2	-
4.	DSC-B-II	4	-	4	4	50	-	50	18	2	-
5.	DSC-B-III	4	-	4	4	50	-	50	18	2	-
6.	SEC-B-I	-	4	4	2	-	50	50	18	-	3
7.	SEC-B-II	-	4	4	2	-	50	50	18	-	3
8.	SEC-B-III	-	4	4	2	-	50	50	18	-	3
9.	SEC-B-IV	-	-	2	2	-	50	50	18	-	-
<b>Total</b>		20	16	38	28	230	220	450	-	-	
<b>Grand Total</b>		40	32	76	56	460	440	900	-	-	

<ul style="list-style-type: none"> <li>• Student Contact Hrs Per week: 36 hrs</li> </ul>	<ul style="list-style-type: none"> <li>• Total marks for B.Voc.- Diploma: 900</li> </ul>
<ul style="list-style-type: none"> <li>• Theory and Practical Lectures: 48 Minutes Each</li> </ul>	<ul style="list-style-type: none"> <li>• Total credits for B.Voc.- Diploma: 56</li> </ul>
<ul style="list-style-type: none"> <li>• AECC: Ability Enhancement Compulsory Course (Compulsory English)</li> </ul>	
<ul style="list-style-type: none"> <li>• Practical workload will for batch of 20 students</li> </ul>	
<ul style="list-style-type: none"> <li>• Practical Examination will be conducted Semester wise for 50 Marks per course (subject).</li> </ul>	
<ul style="list-style-type: none"> <li>• DSC: Discipline Specific Core Course - Candidate can opt three courses (Subjects) from DSC.</li> </ul>	
<ul style="list-style-type: none"> <li>• GEC: Generic Elective Compulsory Course - Candidate can opt any one course (Subject).</li> </ul>	
<ul style="list-style-type: none"> <li>• There shall be separate passing for theory and practical courses.</li> </ul>	
<ul style="list-style-type: none"> <li>• AECC &amp; GEC Internal Evaluation should be done at college or respective departmental level</li> </ul>	
<ul style="list-style-type: none"> <li>• <b>Exit option after Level 5: Students can exit with Diploma Course in Bachelor of Vocation with the completion of courses equal to minimum of 56 credits and also shall have to acquire additional CCC credits by successfully completing CCC-I and CCC-II courses which are assisted by Compulsory Civic Courses</b></li> </ul>	
<ul style="list-style-type: none"> <li>• <b>SEC-A &amp; SEC-B are two parts of Vocational Diploma Course-I.</b> Link for the pool of SEC courses. (You may add or delete any courses as per available facilities)</li> </ul>	

## Eligibility:

**Eligibility for Admission:** For Diploma: 10 + 2 from any faculty/ITI/MCVC or equivalent  
For Advance Diploma: Diploma or equivalent in any related stream.

**Eligibility for Faculty:** 1) Post Graduate with NET / SET/Ph. D. Or  
2) Five Year Industry Experienced Personal  
2) M. A. (English) with NET/SET for Business Communication

**Eligibility for Lab Assistant:** Graduation with related field

**Staffing Pattern: Teaching:** In the 1<sup>st</sup> year of B. Voc. – One Full Time  
one C. H. B. for Business Communication

**Lab. Assistant:** For 1<sup>st</sup> Year of B. Voc. – 1 Part Time  
For 2<sup>nd</sup> and 3<sup>rd</sup> Year (Inclusive of 1<sup>st</sup> Year) of B. Voc. – 1 Full Time

**Bachelor of Vocation (B. Voc.) Part I - Sem. I  
(AECC-A)**

**Paper I: Business Communication-I**

**Paper-I**

Theory: 4 lectures/week

Practical: 02 lectures per week per batch of 20 students

**Credits: 04**

**Total Marks: 50 (Theory 40 + Internal 10)**

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**Units Prescribed for Theory: 40 Marks.**

**Unit 1: Use of English in Business Environment**

**Topics:**

Business Vocabulary: Vocabulary for banking, marketing and for maintaining public relations  
What is a sentence?  
Elements of a sentence  
Types of sentence: Simple, compound, complex

**Unit 2: Writing a Letter of Application and CV/ Resume**

**Topics:**

Structure of a letter of application for various posts  
CV/ Resume and its essentials

**Unit 3: Presenting Information/Data**

**Topics:**

Presenting information/data using graphics like tables, pie charts, tree diagrams, bar diagrams, graphs, flow charts

**Unit 4: Interview Technique**

**Topics:**

Dos and don'ts of an interview  
Preparing for an interview  
Presenting documents  
Language used in an interview

**Practical: Based on the theory units 10 Marks.**

**Reference Books:**

- Sethi, Anjane & Bhavana Adhikari. *Business Communication*. New Delhi: Tata McGraw Hill
  - Tickoo, Champa & Jaya Sasikumar. *Writing with a Purpose*. New York: OUP, 1979.
  - Sonie, Subhash C. *Mastering the Art of Effective Business Communication*. New Delhi: Student Aid Publication, 2008.
  - Herekar, Praksh. *Business Communication*. Pune: Mehta Publications, 2007.
  - Herekar, Praksh. *Principals of Business Communication*. Pune: Mehta Publications, 2003.
  - Rai, Urmila & S. M. Rai. *Business Communication*. Himalaya Publishing House, 2007.
  - Pradhan, N. S. *Business Communication*. Mumbai: Himalaya Publishing House, 2005.
  - Pardeshi, P. C. *Managerial Communication*. Pune: NiraliPrakashan, 2008.
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**Pattern of a Question Paper**  
**B. Voc. Part-I Semester –I (Certificate)**  
**Business Communication-I (AECC-A)**

**Paper No: I**  
**Time: 2 hours**

**Total Marks: 50**

- |  |    |
|--|----|
| Q. 1 Do as directed. Question items on <b>Unit 1</b> to be asked.<br>(10 out 12)                                   | 10 |
| Q. 2 Write a letter of application.<br>OR<br>Draft a CV/ Resume for a particular post.                             | 10 |
| Q. 3 Present a given information or data using a table/ chart/ pie diagram, etc.<br>(Any one diagram to be drawn.) | 10 |
| Q. 4 Fill in the blanks in the given interview.  | 10 |

**Practical Evaluation: 10 Marks**

Oral and Presentation based on the units prescribed.

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**Note:**

The above structure is designed as per the guidelines of NSQF and NEP. The structure may be flexible for B.Voc. I courses as per their requirements.

**Bachelor of Vocation (B. Voc.) Part I - Sem. I (Certificate)**  
**Generic Elective Compulsory Course (GEC- A)**  
**Paper Title: Introduction to Electrical Vehicle**

**Paper No: II**

**Theory: 4 lectures/week**

**Practical: 2 lectures/week/batch**

**Credits: 04**

**Total Marks: 50 (Theory 40 + Internal 10)**

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**Course Outcomes:** The students will acquire knowledge of

1. Introduction: Electric Vehicle
2. Electric Drive and controller
3. Vehicle control System
4. Energy Storage Solutions (ESS)
5. Electric Vehicles charging station
6. Indian and Global Scenario for EV

**Content of syllabus:**

Unit I: (8 Hrs)

History, Components of Electric Vehicle, Comparison with Internal combustion Engine : Technology, Comparison with Internal combustion Engine: Benefits and Challenges, EV classification and their electrification levels, EV Terminology.

Unit II: (8 Hrs)

Types of Motors, Selection and sizing of Motor, RPM and Torque calculation of motor, Motor Controllers, Component sizing, Physical locations, Mechanical connection of motor, Electrical connection of motor.

Unit III: (8 Hrs)

Power train control system: Electronic control system used in MPFI/GDI and CRDI system, Motion control system: ABS, Electronic stability program, Electronic suspension, electronic power steering, Safety system: Air bags, Collision avoidance, Low pressure warning system, Park assists.

Unit IV: (8 Hrs)

Cell Types (Lead Acid/Li/NiMH), Battery charging and discharging calculation, Cell Selection and sizing, Battery lay outing design, Battery Pack Configuration, Battery Pack Construction, Battery selection criteria

Unit V: (8 Hrs)

Type of Charging station, Selection and Sizing of charging station, Components of charging station, Single line diagram of charging station, Battery selection criteria

Unit VI: (8 Hrs)

Technology Scenario, Market Scenario, Policies and Regulations, Payback and commercial model, Payback and commercial model, Policies in India

**Books Recommended: (List of Minimum 5 Books)**

**01 Electric & Hybrid Vehicles by Dr. A.K. Babu**

**02 Electric Vehicles: The Automobiles of the Future by Otto|Tanaka Bischof (Ted), Ted Tanaka**

**03 Basic Electrical and Electronics Engineering by B H Deshmukh , K P Akole , V G Yangalwar**

**04 Electrical Vehicle Technology by Prof. Sunil R. Pawar**

**Note: (If any - such as**

(1. In theory examination, the weightage to numerical problems should not exceed 30%.

2. Students can use scientific calculators in theory examination.)

**Bachelor of Vocation (B. Voc.) Part I - Sem. I(Certificate)**  
**Discipline Specific Core Course (DSC– A-I)**  
**Paper Title: Vehicle Types and Transmission.**

**Paper No: III**  
**Theory: 4 lectures/week**

**Credits: 04**  
**Total Marks: 50 (Theory)**

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**Course Outcomes:** The students will acquire knowledge of

1. Introduction & Types of Vehicle
2. Vehicle Layouts
3. Clutches
4. Gear Box
5. Drive Lines
6. Final Drive

**Content of syllabus:**

Unit I: (8 Hrs)

Introduction, History & Classification of automobile Vehicle -LMV, HMV ,Commercial vehicle & non Commercial vehicles , Introduction to off road vehicle & types , Two & three wheeler-Case study of Indian models of major motor cycles, scooters & mopeds.

Unit II: (8Hrs)

Types of chassis layout with reference to power plant locations and type of drive, Types of chassis- fully forward, semi forward, Truck or bus chassis,two & three wheeler chassis layout.

Unit III: (8Hrs)

Principle, functions, general requirements, types of clutches, cone clutch,single-plate clutch, diaphragm spring clutch, multi-plate clutch, centrifugal clutch, electromagnetic clutch, lining materials, Clutch linkages,

Unit IV: (8Hrs)

Necessity of gear box, Requirements of gear box, Functions of gear box,Types, Sliding mesh, Constant mesh, Synchromesh. Principle, construction and working. Types of gears used in transmission Lubrication of gear box,Gear shifting mechanism

Unit V:(8Hrs)

Propeller shaft, universal joints, hooks and constant velocity joints, Drive line arrangements – Hotchkiss drive & torque tube drive. Live and dead axles, Axle shafts, All wheel drive,

Unit VI:(8Hrs)



Purpose of final drive & drive ratio, Different types of final drives, need of differential, Constructional details of differential unit, Non-slip differential, Differential lock, Differential housing, Final drive lubrication.

**Books Recommended: (List of Minimum 5 Books)**

**01 Automobile Dr. Kirpal Singh**

**03 The Motor vehicle Newton, Steeds, Garrett, Butterworth Heinmann.**

**04 Automobile Vol.-2 Anil Chikara, Standard Publishers.**

**05 Automobile Mechanics Crouse / Anglin. Tata McGraw Hill.**

**06 Automobile R.B. Gupta, Satya Prakashan**

**Note: (If any - such as**

- (1. In theory examination, the weightage to numerical problems should not exceed 30%.
2. Students can use scientific calculators in theory examination.)

**Bachelor of Vocation (B. Voc.) Part I - Sem. I(Certificate)**  
**Discipline Specific Core Course (DSC– A-II)**  
**Paper Title: Petrol Engines.**

**Paper No : IV**  
**Theory: 4 lectures/week**

**Credits: 04**  
**Total Marks: 50 (Theory)**

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**Course Outcomes:** The students will acquire knowledge of

1. Petrol engine principles and fundamentals
2. Constructional features of petrol engine components
3. Fuel Systems in Petrol engines
4. Engine cooling system
5. Lubrication systems
6. Ignition System in petrol engines

**Content of syllabus:**

Unit I: (8Hrs)

Introduction, Basic engine nomenclature, Classification of petrol engines, Merits and Demerits of petrol engines, Thermodynamic cycle of petrol engine, Four stroke petrol engine, Two stroke petrol engine – Construction, working, Valve & port arrangements, scavenging systems, comparison with 4 stroke engines, Advantages, Disadvantages of two and four stroke petrol engines

Unit II: (8Hrs)

Cylinder block, cylinder liner, types of liner, comparison of dry and wet liners, cylinder head, gaskets, type of gaskets, Piston, piston ring, pin, Crank shaft, camshaft, connecting rod, Valve, valve mechanisms, valve timing, port-timing diagram, manifolds, flywheel, Types of camshaft drives

Unit III: (8 Hrs)

Fuel feed system in petrol engines, Mechanical fuel pump, electrical fuel pump, Principles of carburetion, Simple carburetor, Starting, Idling & slow running, acceleration, Main metering system, choke system. S.U. Carburetor, Solex carburetor, Modern Carburetors, Carburetors used in two wheelers and four wheelers. Electronic fuel injection system, Multi point fuel injection system

Unit IV: (8 Hrs)

Introduction – Purpose of cooling, Systems- Air cooling system, water cooling systems, Comparison of air & water cooling systems, Parts of cooling system. Thermostat, water expansion tank, Temperature Indicator Pressure cap, water pump, fan and fan belt, radiator, Cooling water additions

Unit V : (8Hrs)

Introduction, Purpose of lubrication, parts to be lubricated, functions and properties of engine lubricating oils, additives for lubricants, Classification of lubricating oils. Dry Sump lubrication system, wet sump lubrication system, mist lubrication system, pressurized lubrication system, splash lubrication system.

Unit VI:( 8Hrs)

Requirement of ignition system, Types, Battery ignition and Magneto ignition, Working of Battery, Ignition coil, Spark plug –purpose, types, Electronic engine control unit (ECU) – Operation, Diagnosis

**Books Recommended: (List of Minimum 5 Books)**

01 Internal combustion engine M.L Mathur R.P.Sharma, Dhanpat Rai Pub.

02 Automobile Dr. Kirpal Singh

03 The Motor vehicle Newton, Steeds, Garrett, Butterworth.

04 Automobile Vol.-2 Anil Chikara, Standard Publishers.

05 Automobile Mechanics Crouse / Anglin. Tata McGraw Hill.

**Note: (If any - such as**

- (1. In theory examination, the weightage to numerical problems should not exceed 30%.
2. Students can use scientific calculators in theory examination.)

**Bachelor of Vocation (B. Voc.) Part I - Sem. I (Certificate)**  
**Discipline Specific Core Course (DSC- A-III)**  
**Paper Title: Engineering Drawing.**

**Paper No: V**  
**Theory: 4 lectures/week**

**Credits: 04**  
**Total Marks: 50 (Theory)**

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**Course Outcomes:** The students will acquire knowledge of

1. Fundamentals of engineering Drawing
2. Engineering Curves
3. Constructions of special curves.
4. Projection of points & lines
5. Orthographic Views
6. Isometric projection

**Content of syllabus:**

Unit I: (8Hrs)

Importance of engineering drawing - drawing instruments: drawing board, mini drafter, compass, divider, protractor, drawing sheets etc., - layout of drawing sheets. Importance of legible lettering and numbering  
Dimensioning - Need for dimensioning - terms and notations as per BIS - Dimension line, Extension line and Leader line - Methods of dimensioning Scales - Study of scales - full size scale, reduced scale and enlarged scale.

Unit II: (8Hrs)

Conics: - Different types - Definition of locus, focus and directrix - Applications of ellipse, parabola and hyperbola. Ellipse: - Construction of ellipse by concentric circle method, rectangular method and Eccentricity method when focus and directrix are given Parabola: - Construction of parabola by rectangular method, eccentricity method when focus and directrix are given. Hyperbola: - Construction of hyperbola by rectangular method and eccentricity method when focus and directrix are given.

Unit III: (8Hrs)

Geometric curves: Definition, application and construction of cycloid - epicycloid- hypocycloid, Involute of a circle - Archimedean spiral - helix

Unit IV: (8Hrs)

Projection of points - points in different quadrants. Projection of straight lines - parallel to one plane and perpendicular to other plane - inclined to one plane and parallel to the other plane - parallel to both the planes - inclined to both the planes (1st angle method only).

Unit V: (8Hrs)

Orthographic projection of the given pictorial view by 1st angle method of projection only. Study of types of sections, sectional orthographic projections

Unit VI

Introduction to isometric view to the example of cube isometric axes, scale, isometric Projection & isometric views, construction of isometric & non isometric lines, angles, Circles, sphere, arc etc.

Drawing isometric views of simple solids & objects, dimensioning - only length, width & height of isometric views.

**Books Recommended: (List of Minimum 5 Books)**

- 1. Engineering Drawing, Bhatt N.D. and Panchal V.M. Charotar Publishing House, 50th Edition, 2010.**
- 2. Engineering drawing Gill P.S., S.K.Kataria & Sons.**
- 3. Engineering Drawing Gopalakrishna K.R.,” (Vol. I&II combined),**
- 4. Engineering Graphics Venugopal K. and Prabhu Raja V., New Age International.**
- 5. Engineering Drawing Basant Agarwal and Agarwal C.M. Tata McGraw Hill Publishing**

**Note: (If any - such as**

- (1. In theory examination, the weightage to numerical problems should not exceed 30%.
2. Students can use scientific calculators in theory examination.)

**Bachelor of Vocation (B. Voc.) Part I - Sem. I(Certificate)**  
**Skill Enhancement Courses (SEC- A-I)**  
**Paper Title: LABORATORY WORK.**

**Paper No: P. I.**  
**Practical: 4 lectures/week**

**Credits: 02**  
**Total Marks: 50 (Practical)**

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**Course Outcomes:** The students will acquire knowledge of

1. Transmission System

**Pre requisites Note: (If Any- such as Knowledge of the topics in the theory papers.)**

**List of Practicals: (Minimum 10)**

1. Testing the transmission system for fault detection.
2. Testing of Clutch for slip, clutch noise, power loss, setting of clutch.
3. Dismantling and assembly of single plate, multi-plate and centrifugal clutch. Overhauling and repair of clutch
4. Testing of gear box for noise, oil leak, shifting etc. , Dismantling-cleaning-inspection-assembling of gear box components.
5. Overhauling constant mesh gearbox, synchromesh gearbox .Overhauling transfer case. -
6. Testing of CVT, Repair and maintenance of CVT
7. Checking of propeller shaft, joints for wear, noise etc. Dismantling-cleaning-inspection-assembling of propeller shaft and joints
8. Checking of final drive, differential and axle shafts for wear, noise etc.
9. Dismantling-cleaning-inspection-assembling of final drive, differential and axle shafts
10. Inspection, checking and replacement of wheel bearings
11. Checking of wheels and tyres for noise, wear and tear. Replacement of wheels.
12. Replacement of tyres.

**Student Instructions:**

**1. Wear affron 2. Use safety goggles and cap.3. Use safety shoes.**

**Laboratory Requirements:**

**1. Tool Box**

**2. lab instruments.**

**Nature of Practical Question Paper:**

**-Details**

**Bachelor of Vocation (B. Voc.) Part I - Sem. I(Certificate)**  
**Skill Enhancement Courses (SEC– A-II)**  
**Paper Title: Engineering Drawing**

**Paper No: P. II.**  
**Practical: 4 lectures/week**

**Credits: 02**  
**Total Marks: 50 (Practical)**

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**Course Outcomes:** The students will acquire knowledge of

1. Geometrical Constructions
2. Engineering curves & Loci of points
3. Orthographic projections
4. Isometric projection
- 5.

**Pre requisites Note: (If Any- such as Knowledge of the topics in the theory papers.)**

**List of Practical: (Minimum 10)**

1. Draw the following figures with dimensions- Rectangle, circle, pentagon, hexagon, and two composite figures involving tangential exercises.
2. Three different curves are to be draw using any one method .ii) Draw locus of point on any one mechanism iii) Draw cycloid, epicycloids and hypocloid
3. Two objects by first angle projection method, Full orthographic views - One sheet, Sectional orthographic views – One sheet
4. Isometric views of two objects-One sheet  
Isometric projection of two objects–One sheet

**Student Instructions:**

- 1.
- 2.
- 3.

**Laboratory Requirements:**

1. DRAWING BOARD
2. DRAWING TABLE

**Nature of Practical Question Paper:**

**-Details**

**Bachelor of Vocation (B. Voc.) Part I - Sem. I(Certificate)**  
**Skill Enhancement Courses (SEC– A-III)**  
**Paper Title: Workshop**

**Paper : P. III**  
**Practical: 4 lectures/week**

**Credits: 02**  
**Total Marks: 50 (Practical)**

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**Course Outcomes:** The students will acquire knowledge of

1. WOOD WORKING SHOP:
2. WELDING SHOP:
3. FITTING SHOP:
4. PLUMBING SHOP:
5. SHEET METAL SHOP:
6. TURNING SHOP

**Pre requisites Note: (If Any- such as Knowledge of the topics in the theory papers.)**

**List of Practicals: (Minimum 10)**

1. Demonstration of different wood working tools / machines. Demonstration of different wood working processes, like planning, marking, chiseling, grooving, turning of wood etc. One simple job involving any one joint like mortise and tenon dovetail, bridle, half lap etc.
2. Demonstration of different welding tools / machines. Demonstration on Arc Welding, Gas Welding, gas cutting and rebuilding of broken parts with welding. One simple job involving butt and lap joint.
3. Demonstration of different fitting tools and drilling machines and power tools. Demonstration of different operations like chipping, filing, drilling, tapping, cutting etc. One simple fitting job involving practice of chipping, filing, drilling, tapping, cutting etc
4. Demonstration of different plumbing tools, Demonstration of different operations in plumbing, observing different pipe joints and pipe accessories. Different samples of PVC pipes and PVC pipe fittings. One job on simple pipe joint with nipple coupling for standard pipe, Pipe threading using standard die sets.
5. Demonstration of different sheet metal tools / machines. Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing, soldering and riveting. One simple job involving sheet metal operations and soldering and riveting.
6. Demonstration of turning, threading operation One job related to Plane and Taper turning, threading and knurling.

**Student Instructions:**

1. **Wear apron. Use safety goggles and cap. Use safety shoes.**



**Laboratory Requirements:**

- 1.
- 2.

**Nature of Practical Question Paper:**

**-Details**

**Bachelor of Vocation (B. Voc.) Diploma in Automobile Part I - Sem. I (Certificate)**

**Skill Enhancement Courses (SEC– A-IV)**

**Paper Title: Project/Field Work/Industrial Visit/Study Tour.**

**Paper No: P. IV**

**Credits: 02**

**Term Work: 2 lectures/week**

**Total Marks: 50(Internal)**

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**Course Outcomes:** The students will acquire knowledge of

1. Industry
2. Field work
3. Tools
4. Community work
5. Labour rights

**Important Note:** Field Work/Industrial Visit/Study Tour should be of **minimum five days** in or out of Maharashtra.

**Suggested Places:**

1. In Maharashtra:
2. Out of Maharashtra:

**Student Instructions:**

- 1.
- 2.
- 3.

**Laboratory Requirements:**

- 1.
- 2.

**Nature of Evaluation: INTERNAL**

**-Details**

**Bachelor of Vocation (B. Voc.) Part I - Sem. II (Diploma in Automobile)  
(AECC-B)**

**Business Communication-II**

**Paper No: VI**

**Credits: 04**

**Theory: 4 lectures/week**

**Total Marks: 50 (Theory 40 + Internal 10)**

**Practical: 02 lectures per week per batch of 20 students**

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**Units Prescribed for Theory: 40 Marks.**

**Unit 1: Group Discussion**

**Topics:**

- Preparing for a Group Discussion
- Initiating a Discussion
- Eliciting Opinions, Views, etc.
- Expressing Agreement/ Disagreement
- Making Suggestions; Accepting and Declining Suggestions
- Summing up.

**Unit 2: Business Correspondence**

**Topics:**

- Writing Memos, e-mails, complaints, inquiries, etc.
- Inviting Quotations
- Placing Orders, Tenders, etc.

**Unit 3: English for Negotiation**

**Topics:**

- Business Negotiations
- Agenda for Negotiation
- Stages of Negotiation

**Unit 4: English for Marketing**

**Topics:**

- Describing/ Expaining a Product/ Service
- Promotion of a Product
- Dealing/ bargaining with Customers
- Marketing a Product/ Service: Using Pamphlets, Hoardings, Advertisement, Public Function/ Festival

**Practical: Based on the theory units 10 Marks.**

**Reference Books:**

- Herekar, Praksh. *Business Communication*. Pune: Mehta Publications, 2007.
  - Herekar, Praksh. *Principals of Business Communication*. Pune: Mehta Publications, 2003.
  - John, David. *Group Discussions*. New Delhi: Arihant Publications.
  - Kumar, Varinder. *Business Communication*. New Delhi: Kalyani Publishers, 2000.
  - Pardeshi, P. C. *Managerial Communication*. Pune: NiraliPrakashan, 2008.
  - Pradhan, N. S. *Business Communication*. Mumbai: Himalaya Publishing House, 2005
  - Rai, Urmila & S. M. Rai. *Business Communication*. Mumbai: Himalaya Publishing House, 2007.
  - Sethi, Anjanee & Bhavana Adhikari. *Business Communication*. New Delhi: Tata McGraw Hill.
  - Tickoo, Champa & Jaya Sasikumar. *Writing with a Purpose*. New York: OUP, 1979.
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**Pattern of a Question Paper**  
**B. Voc. Part-I Semester –II (Diploma in Automobile)**  
**Business Communication-II (AECC-B)**

**Paper No: VI**

**Time: 2 hours**

**Total Marks: 50**

**Time: 2 hours Total Marks: 40**

- |  |    |
|--|----|
| Q. 1 Fill in the blanks in the following Group Discussion.(On <b>Unit 1</b> ) (10 out 12)  | 10 |
| Q. 2 Attempt <b>ANY ONE</b> of the following ( <b>A</b> or <b>B</b> ): (On <b>Unit 2</b> ) | 10 |
| Q. 3 Fill in the blanks with appropriate responses:(On <b>Unit 3</b> )                     | 10 |
| Q. 4 Attempt <b>ANY ONE</b> of the following ( <b>A</b> or <b>B</b> ):(On <b>Unit 4</b> )  | 10 |

**Practical Evaluation: 10 Marks**

Oral and Presentation based on the units prescribed.

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**Note:**

The above structure is designed as per the guidelines of NSQF and NEP. The structure may be flexible for B.Voc. I courses as per their requirements.

**Bachelor of Vocation (B. Voc.) Part I - Sem. II (Diploma)**  
**Generic Elective Compulsory Course (GEC-B)**  
**Paper Title: Introduction to Autotronics**

**Paper No:VII**

**Credits: 04**

**Theory: 4 lectures/week**

**Total Marks: 50 (Theory 40 + Internal 10)**

**Practical: 2 lectures/week/batch**

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**Course Outcomes:** The students will acquire knowledge of

1. Fundamentals of Automotive Electronics
2. Sensors & Actuators:
3. Electronic Fuel Injection & Ignition System:
4. Digital Engine Control System:
5. Automotive Electrical
6. Comfort & Safety:

**Content of syllabus:**

Unit I: (8 Hrs)

Microprocessor and micro Computer applications in automobiles; components for engine management System; electronic management of chassis system; vehicle motion control; electronic panel meters.

Unit II:(8 Hrs)

Introduction; Basic sensor arrangement; Types of Sensors such as oxygen sensors, Crank angle position sensors, fuel metering/vehicle speed sensors and detonation sensors, altitude sensors, flow Sensors, throttle position sensors, solenoids, stepper motors, relays.

Unit III:(8 Hrs)

Introduction; feedback carburetor system; throttle body injection and multi point fuel injection System; injection system controls; advantage of electronic ignition systems; types of solid state system and their principle of operation; electronic spark timing.

Unit IV: (8 Hrs)

Open loop and closed loop control system; engine cooling and warm-up control; acceleration, deceleration and idle speed control; integrated engine control system; exhaust emission control engineering; on-board diagnostics; future automotive electronic systems.

Unit V: (8 Hrs)

Batteries; starter motor & drive mechanism; D.C. generator and alternator; regulation for charging; lighting design; dashboard instruments; horn, warning system and safety devices.

Unit VI: (8 Hrs)

Seats, mirrors and sun roofs; central locking and electronic Windows; cruise control; in-car multimedia;

security; airbag and belt tensioners; other safety and comfort systems; new developments.

**Books Recommended: (List of Minimum 5 Books)**

1. Automotive Electronics Handbook, Ronald K. Jurgen, McGraw Hill Publishing
2. Automotive Electricity and Electronics, Al Santini, Delmar Publishers
3. Automobile Electrical & Electronic Equipments, Young, Griffiths, Butterworth Publication, London.
4. Understanding Automotive Electronics, Bechfold
5. Autotronics by Smith Manilal Solanki

**Note: (If any - such as**

- (1. In theory examination, the weightage to numerical problems should not exceed 30%.
2. Students can use scientific calculators in theory examination.)

**Bachelor of Vocation (B. Voc.) Part I - Sem. II (Diploma in Automobile)**

**Discipline Specific Core Course (DSC-B-I)**

**Paper Title: Diesel Engines**

**Paper No: VIII**

**Theory: 4 lectures/week**

**Credits: 04**

**Total Marks: 50 (Theory)**

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**Course Outcomes:** The students will acquire knowledge of

1. Diesel engine principles and fundamentals
2. Constructional features of diesel engines
3. Fuel System for Diesel engine
4. Engine intake and Exhaust System
5. Superchargers and Turbochargers
6. Engine Fuels

**Content of syllabus:**

Unit I: (08 Hrs)

Introduction, Diesel engine nomenclature, Classification of diesel engines, Advantages of diesel Engines Thermodynamics cycle of diesel engine, Four strokediesel engine, Two stroke diesel engine Comparison of two stroke and four stroke cycle engine,

Unit II: (08 Hrs)

Cylinder block, cylinder liner, types of liner, cylinder head, gaskets, type of gaskets, Piston, piston ring, pin, Crank shaft, camshaft, connecting rod, valve, valve cooling, valve mechanisms, valve timing, port-timing diagram, manifolds, silencers, flywheel etc. Types of camshaft drives.

Unit III: (08 Hrs)

Requirement of fuel injection system, various components of fuel injection system, Types of fuel injection pumps for single and multi cylinder engines ,inline and rotary types of fuel injection pumps. Types of fuel injectors. DI and IDI engines, Working of common rail fuel injection system, Governors, types, working

Unit IV: (08Hrs)

Air filtering system, Types of air cleaners – dry, wet air cleaners, Intake manifold arrangements for single and multi cylinder engines Exhaust system – Exhaust manifold types, mufflers and silencers, exhaust pipes

Unit V: (08Hrs)

Need of supercharging, types of superchargers, effect of supercharging on engine, benefits, disadvantages, Need of turbo charging, types of turbo charging, effect of turbo charging on engine, benefits, disadvantages

Unit V: (08Hrs)

Types of fuels, fuel properties, SI and CI engine fuels, Fuel rating - Octane and Cetane no. , Alternative fuels CNG fueled diesel engine,

**Books Recommended: (List of Minimum 5 Books)**

**01 Internal combustion engine :M.L Mathur R.P.Sharma, Dhanpat Rai Publication**

**02 Automobile Dr. Kirpal Singh**

**03 The Motor vehicle Newton, Steeds, Garrett, Butterworth Heinmann.**

**04 Automobile Vol.-2 Anil Chikara, Standard Publishers.**

**05 Automobile Mechanics Crouse / Anglin. TATA McGRAW – HILL**

**Note: (If any - such as**

- (1. In theory examination, the weightage to numerical problems should not exceed 30%.
2. Students can use scientific calculators in theory examination.)



**Bachelor of Vocation (B. Voc.) Part I - Sem. II (Diploma in Automobile)**

**Discipline Specific Core Course (DSC– B-II)**

**Paper Title: Suspension and Brakes**

**Paper No: IX**

**Theory: 4 lectures/week**

**Credits: 04**

**Total Marks: 50 (Theory)**

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**Course Outcomes:** The students will acquire knowledge of

1. Front Axle and Steering
2. Brakes
3. Suspension Systems
4. Vehicle Body
5. Wheels and tires
6. Vehicle Air Conditioning System

**Content of syllabus:**

Unit I: (08 Hrs)

Types of front axle-Dead axle, live axle.Type of stub axle arrangements Elliot, reverse Elliot, Lamoine, reverse Lamoine. Front wheel assembly.Steering system. Steering linkages, Steering geometry and its effects– Caster, camber, king pin inclination, toe in–toe out,Correct Steering angle. Under steering and over steering,Turning radius.Construction, working and application of Steering gearbox-rack and pinion type, recirculating ball type, and worman droller type.

Unit II: (08Hrs)

Introduction Function and necessity of brakes.Classification of brakes and braking systems. Construction and working of –disc brake and drum brake Friction materials used for brake shoes and pads. Characteristics of friction material-brake fade, coefficient of friction, dry friction and wet friction braking systemsConstruction and working of-Mechanical braking system, Hydraulic Braking system, Air braking system, Hydraulic operated air braking system and vacuum assisted braking system.Concept and working of antilock braking system.Parking brake Properties of brake fluids and their specifications.

Unit III: (08Hrs)

Suspension systems , Rigid and independent Suspension.Types of Independent suspension system- Mc Pherson strut,wishbone type, Semi-elliptical Leaf spring, coil spring, torsion bar arrangement, Construction and working of Air Suspension System, Construction and working of-Shock absorbers- Telescopic and Gas filled, Anti roll baror stabilizer bar.

Unit IV: (08Hrs)

Vehicle body types, Car, Commercial, Transport – goods, passenger vehicle bodies, Body materials, Body component joining methods, Seat layout, Type of seats.

Unit V: (08Hrs)

Type of wheels, Wheel construction, Material, Balancing, motorcycles, scooters, sports bike wheels Tire types, Tire specifications, tire material, Tire tread and pattern, Tire inflation pressure, Tire maintenance, Application and criteria for selection of wheels and tyres.

Unit VI: (08Hrs)

Fundamentals of Refrigeration and air conditioning. Description of vapor compression cycle with components in the circuit. Layout and operation of HVAC. Type of refrigerants used in car air conditioning and their properties. Human comfort conditions. Temperature control system, humidity control

**Books Recommended: (List of Minimum 5 Books)**

- 1 Ramlingam K.K. Automobile Scitech Publication
- 2 Kirpal Singh Automobile Standard Publication
- 3 Anil Chikara Automobile Satya Prakashan New
- 4 R.B. Gupta Automobile Satya Prakashan New
- 5 S. Srinivisan Automotive Mechanics Tata McGraw-Hill

**Note: (If any - such as**

- (1. In theory examination, the weightage to numerical problems should not exceed 30%.
2. Students can use scientific calculators in theory examination.)

**Bachelor of Vocation (B. Voc.) Part I - Sem. II(Diploma in Automobile)**  
**Discipline Specific Core Course (DSC– B-III)**  
**Paper Title: Automotive Electrical System**

**Paper No: X**

**Theory: 4 lectures/week**

**Credits: 04**

**Total Marks: 50 (Theory)**

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**Course Outcomes:** The students will acquire knowledge of

1. Electrical & Electronic Components
2. Battery
3. Starting And Charging System
4. Ignition Systems
5. Lighting accessories-fundamentals

**Content of syllabus:**

Unit I: (08 Hrs)

Purpose and operation of electrical components like switches, relays, solenoids, buzzers, and resistors. Purpose of circuit protection devices like fuses, maxi fuses, circuit breakers (Manual and automatic resetting types.) and fusible links. Testing of circuit defects like open circuits, shorts to grounds, voltage drop. Working of Electromagnetic gauges like temp Gauges, fuel gauge, engine oil pressure gauge, Speedo-meter gauge. Features of scan tester. Working of electrical accessories like windshield wiper, washer pumps, blower motor, electrochromic mirror, power window, power seat, power door lock

Unit II: (08 Hrs)

Lead acid battery—components & operation. Maintenance free battery—construction. Concept of Low maintenance battery. Battery ratings and specifications. Battery maintenance and safety precautions. Battery testing—Battery terminal test, Leakage test, Specific Gravity Test, Open circuit test, Capacity test, Battery drain test. Battery charging—Initial charging procedure, dry charged battery—precautions. Slow and fast rate charging and trickle charging. Jump starting—Procedure and precautions. Factors affecting battery life. Battery failures—cycle failure, internal short circuit, over charging, local action and sulphation

Unit III: (08 Hrs)

Construction and working of starting system. Types of starter drive (Bendix and over running clutch types only) construction and working. Testing of starting system—Quick testing, Current draw test, Insulated circuit resistance test, Ground circuit test, No crank test, free speed test. Construction & operation of alternator. Initial excitation and self excitation. Alternator testing—Current output test, Field current draw

test.Regulator output test.Alternator components testing-rotor, stator, Internal Regulator and rectifier.Regulation-Electronic, Computer Regulation circuit lay out and operation. Operation of charge indicator light circuit.

Unit IV: (08Hrs)

Need of ignition system.Classification of ignition systems on basis of–Magneto ignition system construction and working of CDI system.Components of ignition system:-Ignition coil types, Distributor, spark plug, cords, and condenser.Advance & retard timing mechanism-construction and working.Electronic (or solid state) ignition system with distributor-circuit diagram and working.Distributor less/computer controlled oil ignition system operation.Sensors and Ignition Control Module for triggering and timing of spark.

Unit V: (08Hrs)

Operation of automatic head light dimming.Operation of automatic on /off head light with time delay. Use and working of fiber optics & its diagnosis.Operation of key less entry.Operation of common anti-theft system Purpose & operation of automatic door lock system

**Books Recommended: (List of Minimum 5 Books)**

**01 Barry Hollenbeck Automotive Electricity, Electronics & Computer Controls Delmar Publishers**

**02 Jack Erjavec, Robert Scharff Automotive Technology: A System Approach Delmar Publisher Inc**

**03 P.L. Kohli Automotive Electrical Equipment Tata McGraw-Hill**

**04 Trevor Mellard Automotive electronic systems ELBS**

**Note: (If any - such as**

- (1. In theory examination, the weightage to numerical problems should not exceed 30%.
2. Students can use scientific calculators in theory examination.)

**Bachelor of Vocation (B. Voc.) Part I - Sem. II(Diploma)**  
**Skill Enhancement Courses (SEC–B-I)**  
**Paper Title: Two Wheeler Maintenance.**

**Paper No: PV**  
**Practical: 4 lectures/week**

**Credits: 02**  
**Total Marks: 50 (Practical)**

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**Course Outcomes:** The students will acquire knowledge of

1. Servicing of Two Wheeler
2. clutch and accelerator
- 3.
- 4.
- 5.

**Pre requisites Note: (If Any- such as Knowledge of the topics in the theory papers.)**

**List of Practicals: (Minimum 10)**

- 1 Identify the parts & general servicing of Two Wheeler and Three wheeler, washing, cleaning, oiling, greasing and lubricating.
2. Adjusts control cables for brake, clutch and accelerator. tightens loose parts and makes necessary fittings and connections.
3. Clean spark plug. Changes engine oil, starts engine and tunes it up.
4. Diagnose - causes and remedy for engine not starting, high fuel consumption, Practice on engine tune. Tests performance of vehicle by driving on road and makes further opinion to remove defects noticed if any.
5. Practice on removal of fuel tank; check that fuel flow freely from the petrol tap. Practice on removal of petrol tap and clean the strainer and assemble.
6. Dismantling the two wheeler engine, cleaning and inspecting the parts, checking engine bore, piston rings, connecting rod
7. Assembling all the parts after assembling inspect Engine oil level, clutch cable free play, Drive chain tension, performance of electrical system.
8. Remove carburetor dismantle, check, cleans and set
9. Removing clutch assembly from Two-wheeler and three wheeler cleaning and inspecting parts. Replacing defective parts. Fitting clutch assembly.
10. Practice on removal of front fork, inspection of front fork spring, fork tube, piston, slider and assembling of front fork. Dismantle shock absorbers, check, assemble, test.

**Student Instructions:**

- 1.
- 2.
- 3.

**Laboratory Requirements:**

- 1.
- 2.

**Nature of Practical Question Paper:**

**-Details**

**Bachelor of Vocation (B. Voc.) Part I - Sem. II(Diploma)**  
**Skill Enhancement Courses (SEC– B-II)**  
**Paper Title: Four Wheeler Mechanic**

**Paper No :VI**  
**Practical: 4 lectures/week**

**Credits: 02**  
**Total Marks: 50 (Practical)**

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**Course Outcomes:** The students will acquire knowledge of

- 1.
- 2.
- 3.
- 4.
- 5.

**Pre requisites Note: (If Any- such as Knowledge of the topics in the theory papers.)**

**List of Practicals: (Minimum 10)**

1. Dismantling of unserviceable engine- cleaning, studying the parts in the engine and assembling the engine, practice in the use of correct tools and right procedure.
2. Dismantling an unserviceable engine, cleaning of parts in the engine, measuring of cylinder bore- crank pins, main journals, pistons, studying valve-operating mechanism.
3. Dismantling the cylinder head from the engine decarburizing the cylinder head, removing the valves cleaning reassembling and adjusting tappets.
4. Removing pistons and connecting rods from engine- dismantling cleaning, inspecting checking clearance, installing rings and piston pins.
5. Removing connecting rod assembly- cleaning, checking bearing clearances replacing bearing shells, setting correct clearance, measuring wear in crank pins and main journals in crank shaft.
6. Assembling crankshaft, main bearing, connecting, rods and piston assembly in the engine. Fitting cylinder head and starting the engine and tuning up engine for smooth, slow speed running.
7. Checking and cooling system for overheating, cleaning radiators, dismantling, cleaning, assembling and testing water pumps, reverse flushing the system and adjusting the fan belt tension.
8. Studying the lubrication, oil flow system in engine. Over-hauling oil filters, oil pump.

9. Simple repair in fuel feed system – overhauling of petrol pump, carburetors, fuel filters and air cleaners.

10. Assembling of pressure plate- adjusting the fingers- checking run out of fly wheel and aligning clutch assembly with flywheel.

**Student Instructions:**

- 1.
- 2.
- 3.

**Laboratory Requirements:**

- 1.
- 2.

**Nature of Practical Question Paper:**

**-Details**



**Bachelor of Vocation (B. Voc.) Part I - Sem. II (Diploma)**  
**Skill Enhancement Courses (SEC– B-III)**  
**Paper Title: Petrol Engine maintenance**

**Paper No: P VII**  
**Practical: 4 lectures/week**

**Credits: 02**  
**Total Marks: 50 (Practical)**

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**Course Outcomes:** The students will acquire knowledge of

- 1.
- 2.
- 3.
- 4.
- 5.

**Pre requisites Note: (If Any- such as Knowledge of the topics in the theory papers.)**

**List of Practicals: (Minimum 10)**

1. 1. Removing petrol engine from a vehicle and Refitting petrol engine on the vehicle.
2. Overhauling the cylinder head & rocker arm shaft assembly, Dismantling, cleaning, inspection and assembling valve, guide. Lapping valve seat.
3. Overhauling piston & connecting rod assembly.
4. Dismantling, cleaning, inspection and assembling of engine crankshaft & camshafts
5. Setting valve timing.
6. Dismantling, cleaning, inspection and assembling of timing gear drive /chain drive / belt drive
7. Servicing inlet & exhaust manifolds, silencer & tail pipe.
8. Dismantling, cleaning, inspection and Servicing of fuel tank & fuel lines  
Overhauling ac fuel pump.
9. Dismantling, cleaning, inspection and assembling of Servicing air filter/cleaner.( Dry and oil bath type)
10. Replacing fuel filter element, Overhauling of carburettor.

**Student Instructions:**

- 1.
- 2.
- 3.

**Laboratory Requirements:**

- 1.
- 2.

**Nature of Practical Question Paper:**

**-Details**

**Bachelor of Vocation (B. Voc.) Part I - Sem. II (Diploma)**  
**Skill Enhancement Courses (SEC-B-IV)**  
**Paper Title: Project/Field Work/Industrial Visit/Study Tour.**

**Paper No: P.VIII**

**Credits: 02**

**Term Work: 2 lectures/week**

**Total Marks: 50(Internal)**

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**Course Outcomes:** The students will acquire knowledge of

- 1.
- 2.
- 3.
- 4.
- 5.

**Important Note:** Field Work/Industrial Visit/Study Tour should be of **minimum five days** in or out of Maharashtra.

**Suggested Places:**

1. In Maharashtra:
2. Out of Maharashtra:

**Student Instructions:**

- 1.
- 2.
- 3.

**Laboratory Requirements:**

- 1.
- 2.

**Nature of Evaluation: INTERNAL**

**-Details**