STUDY, EVALUATION SCHEME & SYLLABUS

For

B. VOC.
AUTOMOBILE ENGINEERING (AE)

Based on
AICTE MODEL CURRICULUM
(EFFECTIVE FROM THE SESSION: 2020-21)
### NSFQ Level 5 SEMESTER- I

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Total Teaching/ Training Hours</th>
<th>Evaluation Scheme</th>
<th>End Semester</th>
<th>Total</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BAEV511</td>
<td>Elements of Automobile</td>
<td>30</td>
<td>CT 10 TA 5 AT 5</td>
<td>20</td>
<td>30</td>
<td>50 2</td>
</tr>
<tr>
<td>2</td>
<td>BAEV512</td>
<td>Electrical &amp; Electronic Systems</td>
<td>30</td>
<td>CT 10 TA 5 AT 5</td>
<td>20</td>
<td>30</td>
<td>50 2</td>
</tr>
<tr>
<td>3</td>
<td>BAEV513</td>
<td>Non Commercial vehicles</td>
<td>30</td>
<td>CT 10 TA 5 AT 5</td>
<td>20</td>
<td>30</td>
<td>50 2</td>
</tr>
<tr>
<td>4</td>
<td>BAEV514</td>
<td>Materials for Automobile</td>
<td>30</td>
<td>CT 10 TA 5 AT 5</td>
<td>20</td>
<td>30</td>
<td>50 2</td>
</tr>
<tr>
<td>5</td>
<td>BAEP511</td>
<td>Automobile Lab</td>
<td>30</td>
<td></td>
<td>20</td>
<td>30</td>
<td>50 1</td>
</tr>
<tr>
<td>6</td>
<td>BAEP512</td>
<td>Electrical and Electronics I lab</td>
<td>30</td>
<td></td>
<td>20</td>
<td>30</td>
<td>50 1</td>
</tr>
<tr>
<td>7</td>
<td>BAEP513</td>
<td>Language Lab</td>
<td>30</td>
<td></td>
<td>20</td>
<td>30</td>
<td>50 2</td>
</tr>
<tr>
<td>8</td>
<td>BAET511</td>
<td>Sales consultant (Retail)(ASC/Q1005)</td>
<td>Any one Training 400hrs/ 8weeks</td>
<td></td>
<td></td>
<td>150</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>BAET512</td>
<td>Territory Service Manager (ASC/Q0602)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET513</td>
<td>Spare Parts Operations Executive Level 5 (ASC/Q 1502)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET514</td>
<td>Area Parts Manager (ASC/Q0605)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET515</td>
<td>Automotive Service Technician Level 5 (ASC/Q 1403)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>610</strong></td>
<td></td>
<td><strong>500</strong></td>
<td><strong>24</strong></td>
<td></td>
</tr>
</tbody>
</table>

### NSFQ Level 5 SEMESTER- II

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Total Teaching/ Training Hours</th>
<th>Evaluation Scheme</th>
<th>End Semester</th>
<th>Total</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BAEV521</td>
<td>I.C. Engines</td>
<td>30</td>
<td>CT 10 TA 5 AT 5</td>
<td>20</td>
<td>30</td>
<td>50 2</td>
</tr>
<tr>
<td>2</td>
<td>BAEV522</td>
<td>Transmission systems</td>
<td>30</td>
<td>CT 10 TA 5 AT 5</td>
<td>20</td>
<td>30</td>
<td>50 2</td>
</tr>
<tr>
<td>3</td>
<td>BAEV523</td>
<td>Instruments and Equipment</td>
<td>30</td>
<td>CT 10 TA 5 AT 5</td>
<td>20</td>
<td>30</td>
<td>50 2</td>
</tr>
<tr>
<td>4</td>
<td>BAEV524</td>
<td>Suspension and Damping Systems</td>
<td>30</td>
<td>CT 10 TA 5 AT 5</td>
<td>20</td>
<td>30</td>
<td>50 2</td>
</tr>
<tr>
<td>5</td>
<td>BAEP521</td>
<td>Project</td>
<td>30</td>
<td></td>
<td>20</td>
<td>30</td>
<td>50 1</td>
</tr>
<tr>
<td>6</td>
<td>BAEP522</td>
<td>Measurement Metrology lab</td>
<td>30</td>
<td></td>
<td>20</td>
<td>30</td>
<td>50 1</td>
</tr>
<tr>
<td>7</td>
<td>BAEP523</td>
<td>I.C. Engine lab</td>
<td>30</td>
<td></td>
<td>20</td>
<td>30</td>
<td>50 2</td>
</tr>
<tr>
<td>8</td>
<td>BAET521</td>
<td>Sales consultant (Retail)(ASC/Q1005)</td>
<td>Any one Training (other than 1st sem) 400 hrs/ 8 weeks</td>
<td></td>
<td></td>
<td>150</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>BAET522</td>
<td>Territory Service Manager (ASC/Q0602)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET523</td>
<td>Spare Parts Operations Executive Level 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET524</td>
<td>Area Parts Manager (ASC/Q0605)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET525</td>
<td>Automotive Service Technician Level 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>610</strong></td>
<td></td>
<td><strong>500</strong></td>
<td><strong>24</strong></td>
<td></td>
</tr>
</tbody>
</table>

GV: General Vocational; VP: Vocational Practical; OJT: On Job Training; SSC: Sector Skill Council
### NSFQ Level 6 SEMESTER- III

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Total Teaching/ Training Hours</th>
<th>Evaluation Scheme</th>
<th>End Semester Total</th>
<th>Total</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BAEV631</td>
<td>Commercial vehicles</td>
<td>20</td>
<td>30</td>
<td></td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>BAEV632</td>
<td>Automotive component design</td>
<td>20</td>
<td>30</td>
<td></td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>BAEV633</td>
<td>Electric Vehicles</td>
<td>20</td>
<td>30</td>
<td></td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>BAEV634</td>
<td>Engine Management principles</td>
<td>20</td>
<td>30</td>
<td></td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>BAEE631</td>
<td>Uni. Human Values &amp; ethics/Environment &amp; Ecology</td>
<td>20</td>
<td>30</td>
<td></td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>BAEP631</td>
<td>Electric Vehicles Lab</td>
<td>30</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>BAEP632</td>
<td>Engine Management lab</td>
<td>30</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>BAET631</td>
<td>Automotive Service Technician Level 6 (ASC/Q1404)</td>
<td>Any one Training 400 hrs/ 8 weeks</td>
<td>150</td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET632</td>
<td>Area Service Manager (ASC/Q0603)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET633</td>
<td>Home Installer/Home delivery Manager (ASC/Q1006)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET634</td>
<td>Product Design Engineer (ASC/Q8102)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET635</td>
<td>Quality Controller (ASC/Q1605)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>610</td>
<td></td>
</tr>
</tbody>
</table>

---

### NSFQ Level 6 SEMESTER- IV

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Total Teaching/ Training Hours</th>
<th>Evaluation Scheme</th>
<th>End Semester Total</th>
<th>Total</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BAEV641</td>
<td>Autotronics</td>
<td>20</td>
<td>30</td>
<td></td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>BAEV642</td>
<td>Air Conditioning and Heating systems</td>
<td>20</td>
<td>30</td>
<td></td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>BAEV643</td>
<td>Quality Management in automobile Industry</td>
<td>20</td>
<td>30</td>
<td></td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>BAEV644</td>
<td>Tyre Technology</td>
<td>20</td>
<td>30</td>
<td></td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>BAEH641</td>
<td>Environment &amp; Ecology / Universal Human Values &amp; Ethics</td>
<td>20</td>
<td>30</td>
<td></td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>BAEP641</td>
<td>Autotronics lab</td>
<td>30</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>BAEP642</td>
<td>Air conditioning lab</td>
<td>30</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>BAET641</td>
<td>Automotive Service Technician Level 6 (ASC/Q1404)</td>
<td>Any one Training (other than 3rd sem) 400 hrs/ 8 weeks</td>
<td>150</td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET642</td>
<td>Area Service Manager (ASC/Q0603)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET643</td>
<td>Home Installer/Home delivery Manager (ASC/Q1006)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET644</td>
<td>Product Design Engineer (ASC/Q8102)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET645</td>
<td>Quality Controller (ASC/Q1605)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>610</td>
<td></td>
</tr>
</tbody>
</table>

---

GV: General Vocational; VP: Vocational Practical; OJT: On Job Training; SSC: Sector Skill Council
### NSFQ Level 7 SEMESTER- V

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Total Teaching / Training Hours</th>
<th>Evaluation Scheme</th>
<th>End Semester</th>
<th>Total</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>CT</td>
<td>TA</td>
<td>AT</td>
<td>Total</td>
<td>TE</td>
</tr>
<tr>
<td>1</td>
<td>BAEV751</td>
<td>Modern Vehicle Technology</td>
<td>30</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>BAEV752</td>
<td>Automobile Assembly Principles</td>
<td>30</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>BAEV753</td>
<td>Vehicle safety principles</td>
<td>30</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>BAEV754</td>
<td>Elements of Noise vibration and Harshness control</td>
<td>30</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>BAEH751</td>
<td>Indian Constitution / Essence of Indian Traditional Knowledge</td>
<td>30</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>BAEP751</td>
<td>Elements of Noise vibration and Harshness control lab</td>
<td>30</td>
<td></td>
<td></td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>BAEP752</td>
<td>Modern vehicle Technology lab</td>
<td>30</td>
<td></td>
<td></td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>BAET751</td>
<td>Prototyping Manager (ASC/Q8302)</td>
<td>Any one Training 400 hrs/ 8 weeks</td>
<td>150</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET752</td>
<td>Body Shop In-Charge(ASC/Q1413)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET753</td>
<td>Service Supervisor (ASC/Q1412)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET754</td>
<td>Testing Manager (ASC/Q8405)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET755</td>
<td>Spare Parts Operations In charge (ASC/Q1503)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>610</td>
<td></td>
<td>500</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

### NSFQ Level 7 SEMESTER- VI

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Total Teaching/ Training Hours</th>
<th>Evaluation Scheme</th>
<th>End Semester</th>
<th>Total</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>CT</td>
<td>TA</td>
<td>AT</td>
<td>Total</td>
<td>TE</td>
</tr>
<tr>
<td>1</td>
<td>BAEV761</td>
<td>Automobile servicing</td>
<td>30</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>BAEV762</td>
<td>Traction and Driving Systems</td>
<td>30</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>BAEH761</td>
<td>Essence of Indian Traditional Knowledge / Indian Constitution</td>
<td>30</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>BAEP761</td>
<td>Major Project</td>
<td>180</td>
<td></td>
<td>150</td>
<td>150</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>BAET761</td>
<td>Prototyping Manager (ASC/Q8302)</td>
<td>Any one Training (other than 5th sem) 400 hrs/ 8 weeks</td>
<td>200</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET762</td>
<td>Body Shop In-Charge(ASC/Q1413)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET763</td>
<td>Service Supervisor (ASC/Q1412)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET764</td>
<td>Testing Manager (ASC/Q8405)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BAET765</td>
<td>Spare Parts Operations In charge (ASC/Q1503)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>670</td>
<td></td>
<td>500</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

GV: General Vocational; VP: Vocational Practical; OJT: On Job Training; SSC: Sector Skill Council

4 | B. Voc- Automobile Engineering
UNIT-I:
Introduction: Classification of automobiles- according to number of wheels, propulsion systems, transmission drives, type of fuels, application & capacity, study of main specifications. Components of automobile- functions & layout of frame, frameless construction, axles, steering system, suspension system, braking system, power train & drives, clutch, gear box, final drive, propeller shaft, u-joints, vehicle body, wheels, tyres & tubes.

UNIT-II:
Power Unit: Selection of engine for two wheelers, three wheeler & four wheeler vehicles; constructional & working details of two strokes & four stoke petrol & diesel engines, fuel system, ignition system, starting system, charging system, lighting system, cooling system, lubrication system, combustion & combustion chambers.

UNIT-III:
Steering System and Suspension System: Steering system- requirements, front axle details & steering geometry, castor, camber, toe-in, toe-out steering axis inclination, steering linkages, and different types of steering gear boxes, their constructional & working details. Concept and working of power steering. Need, types of suspension systems, constructional details, characteristics of laminated, coil springs. Introduction to independent suspension, front & rear suspension systems of the vehicle, shock absorbers.

UNIT-IV:
Wheels, Tyres & Braking System: Wheel requirements, types of wheels, their constructional & working details, rims & tyres, types of tyres, tyre selection, ordinary, radial tyres tubeless tyres, their constructional details, comparison & application, wheel balancing. Need and classification of brakes, drum brakes and disc brakes, constructional & working details, introduction to hydraulic brake, parking brake, vacuum assisted hydraulic brakes, air assisted hydraulic brakes, air brakes, leading & trailing brake shoes, self energizing brakes & ABS, working of master cylinder, wheel cylinders, tandem master cylinder, characteristics of brakefluid.

Text Book(s):

Reference Book(s):
UNIT-I:
Fundamentals of DC & AC Circuits: Introduction to DC and AC circuits, Active and passive two terminal elements, Ohms law, Voltage-Current relations for resistor, inductor, capacitor, Kirchhoff's laws, Mesh analysis, Nodal analysis, Ideal sources –equivalent resistor, current division, voltage division. Sinusoids, Generation of AC, Average and RMS values, Form and peak factors, concept of phase or representation, Introduction to three phase systems - types of connections, relationship between line and phase values. Introduction to magnetic circuits- Simple Magnetic Circuits-Faraday's laws, induced emf and inductances.

UNIT-II:

UNIT-III:
Electronic Components & Semiconductor Devices: Resistors, capacitors & inductors (properties, common types, I-V relationship and uses), Overview of Semiconductors - basic principle, operation and characteristics of PN diode, Zener diode, BJT, JFET, optoelectronic devices (LDR, photodiode, phototransistor, solar cell)

UNIT-IV:
Transducers & Digital Electronics: Instrumentation – general aspects, classification of transducers, basic requirements of transducers, passive transducers - strain gauge, thermistor, Hall-Effect transducer, LVDT, and active transducers – piezoelectric and thermocouple.

Number systems: binary codes - logic gates - Boolean algebra, laws & theorems - simplification of Boolean expression - implementation of Boolean expressions using logic gates - standard forms of Boolean expression.

Text Book(s):

Reference Book(s):
5.GV.03 Non-Commercial Vehicle

UNIT-I:
The Power Unit
Two stroke and four stroke SI & CI engine Construction and Working, merit sand demerit, 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 non-commercial vehicles, its types, Chassis and different drive systems for two wheelers, Single, multiple plates and centrifugal clutches, Gear box and its and various gear control sin two wheelers, Front and Rear suspensions systems, Shock absorbers, Panel meters and control on handlebar, Free wheeling 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

Test Books:
1. Two and three wheeler Technology, Dhruv u. Panchal
UNIT-I:
Advanced Materials: Composites – non metallic and metallic. Other specialty materials used in Automotive design and manufacturing. Role of Nano technology in automotive systems.

UNIT-II:
Composite Materials: Mechanics, Manufacturing and Design. Composite materials, including naturally occurring substances such as wood and bone, and engineered materials from concrete to carbon-fiber reinforced epoxies. Development of micromechanical models for a variety of constitutive laws. Link between processing and as-manufactured properties through coupled fluid and structural analyses.

UNIT-III:
Smart Materials and Structures: Theoretical aspects of smart materials, sensors and actuator technologies. It will also cover design, modeling and manufacturing issues involved in integrating smart materials and components with control capabilities to engineering smart structures.

UNIT-IV:

Text Book(s):

Reference Book(s):
5.VP.01 Automobile Lab

List of Experiments:

1. Identification of different chassis components of a vehicle.
2. Identification of different components of S.I. engine.
3. Identification of different components of C.I. engine.
4. Identification of different components of lubrication system of an engine.
5. Identification of different components of cooling system of an engine.
6. Identification of different components of fuel supply system of S.I. engine.
7. Identification of different components of fuel supply system of C.I. engine.
8. Identification of different components of ignition system of S.I. engine.
9. Identification of different components of starting system of an engine.
10. Identification of different components of transmission system of a car.

5.VP.02 Electrical and Electronics I Lab

List of Experiments:

1. Measurement of energy (using single phase and three phase energy meter)
2. Measurement of electrical quantities (like voltage, current, power, power factor in RLC circuits)
3. Study of earthing and measurement of earth resistance.
4. Study of trouble shooting of electrical equipment (fan, iron box, mixer grinder etc)
5. Study of various electrical gadgets (Induction motor, transformer, CFL, LED, PV cell, etc)
6. Testing of the following popular components with:-

<table>
<thead>
<tr>
<th>a) Resistor</th>
<th>b) Potential meter</th>
<th>c) Inductor (Only continents)</th>
</tr>
</thead>
<tbody>
<tr>
<td>d) Capacitor</td>
<td>e) Diode</td>
<td>f) BJT</td>
</tr>
<tr>
<td>g) LED</td>
<td>h) SCR</td>
<td>i) Few digital ICs and analog ICS.</td>
</tr>
</tbody>
</table>

7. Techniques of Soldering.
8. Familiarization of the following equipment.
   a) Multi-meter: - voltage, current, resistance measurement.
   b) Regulated Power Supply: - Set up for certain output voltage and measure it with multimeter.
   c) Signal generator and CRO: - check the signal generator frequencies and amplifier with CRO.
9. V.I. Characteristics of the following components:- a) Rectifier diode b) Zener Diode
10. V.I. Characteristics of SCR.
Module – 1: Listening and speaking skills
In this module the learners will be exposed to a variety of listening activities recorded on audiotapes. These will be samples of good spoken English, which the learner can use as models. Work sheets will accompany the listening material. This module will include the following:

1. Introducing yourself/friends in formal and informal situations.
2. Inviting people (over the phone and face to face) giving details of occasion, time, place and date. Acceptance and refusal of invitation – formal and informal.
3. Seeking and supplying information (example opening an account in a bank, applying for loan etc.)
4. Talking and conveying messages (over the phone and face to face).
5. Giving directions/instruction.
6. Discussing contemporary issues related to environment, child labor, gender bias etc.
7. Listening to excerpts from television and radio.
8. Listening to poems/plays (prescribed).
9. Listening to speeches/talks.
10. Listening to songs like “We shall overcome”.

Module – 2 to 4 (English for specific purposes) (opt any one)
These modules are being offered. A learner has to opt for any one. The first is for academic purposes and the next two are for vocational purposes. The focus is not on the teaching of the subject matter like science and literature but on the way in which language is used in the different subjects.

Module 2: English for Science
This course will introduce learners to some interesting pieces of popular science

1. Health and hygiene
2. Conservation of (nearly extinct) animals.
3. Plant life.

These pieces illustrate the use of English in scientific writing: giving information factually, logically and objectively.

Module 3: English for Receptionist
This module will introduce the learner to a variety of exercises, tasks and meaningful activities related to the receptionist’s use of English. The printed course materials will be supported by tapes.
The following competencies be developed:

1. Receiving messages, making request etc.
2. Supplying information
3. Giving advice and making suggestions
4. Dealing with complaints
5. Making entries in an appointment book, register etc.
Module 4: English for Office Use

This course will help the learner to use English effectively and appropriately in the office environment. The competencies will be developed.
1. Using the telephone taking and passing messages.
2. Receiving messages
3. Marking noting on files and circular.
4. Writing office notes, memos, notices, agendas for meetings.
5. Telegrams and fax messages.
6. Writing business letters, application enquires, complaints.
7. Filling in forms, cheques, pay in ship sets.
LEVEL 5 (SEMESTER II)
5.GV.05 IC Engines

Unit-I
Operation fundamentals
Working principles of IC engines, classification-SI, CI engine, 2 stroke, 4 stroke, IC engine components-constructural details and working.

Unit–II
Engine systems
Cooling system, lubrication, fuel supply, valve operation and valve timing, ignition system

Unit–III
Fuel and combustion
SI Engine- fuels, fuel mixture preparation, fuel combustion process, normal and abnormal combustion, products of combustion, pollutants
CI engines- fuels, fuel injection system, fuel combustion process normal and abnormal combustion, products of combustion, pollutants

Unit-IV
Performance and testing
Engine parameters- bore, stroke, capacity, compression ratio, compression pressure
Performance parameters-Engine RPM, Torque, Power- IHP, BHP, fuel consumption, efficiency-thermal, brake
Engine testing- Measurement of IHP, BHP, Specific fuel consumption, Heat balance sheet, thermal efficiency.

Text Book(s):
[T2] Internal Combustion Engines-V Ganesan, Tata McGraw Hill, Delhi, 602

Reference Book(s):
[R4] Automobile Engineering – Anil Chhikara, Satya Prakashan, Delhi
[R5] I.C Engines and Air Pollution by Obert.
5.GV.06 Transmission Systems

UNIT-I
Transmission requirements: requirements of transmission system, general arrangement of power transmission, general arrangement of rear-engine vehicle with live axles, general arrangement of dead-axle and axles transmission; four-wheel-drive transmission.

UNIT-II
Clutches Requirements of clutches, principle of friction clutches, types of clutches and materials used- cone, single plate, diaphragm-spring, multi-plate, centrifugal, over-running and electromagnetic clutch.

UNIT-III

UNIT-IV
Transmissionsystems-Driveline:Definition,forces&torquesacting;typesofdrives-Hotchkiss,torque tube & radius rod drives; components- propeller shaft, slip joint, universal joints & constant velocity universal joints; front wheel drive; Final drive: definition; types- worm- wheel, straight-bevel gear, spiral-bevel gear & hypoid-gear drives; double-reduction & twin- speed final drives; Differential: Function, principle, construction and working; non-slip differential; differential lock; rear axle- loads acting & types; multi-axle vehicles.

Text / References Books:

1. Heldt P.M.; Torque converters; Chilton Book Co.
2. Giri NK; Automobile Engineering; Khanna Publisher.
3. Newton, Steeds & Garret; Motor Vehicles; B.H. Publication.
5. Check Chart; Automatic Transmission; Harper & Row Publication.
5.GV.07 Instruments and Equipment

UNIT-I
Instrumentation- modes of measurement- primary or direct, secondary or indirect involving one translation, territory- indirect measurement involving two conversions

UNIT II
Servicing Equipment: Garage, service station, tune-up, specification and application of-aircompressor, hydraulic hoist, electro mechanical hoist, jack (mechanical, hydraulic), car washer and automatic car washer, grease dispenser, oil sprayer, tyre changer, wheel balance, wheel aligner, use of vacuum gauge, compression gauge, cam (dwell) angle and r.p.m. tester, battery Tester, spark plug cleaner and tester, ignition timing light, fuel injector tester, fuel consumption tester, cylinder leakage tester, radiator tester, exhaust gas analyzer, smoke meter, on-board/ smart diagnostic tool

UNIT-III
Engine repair, measuring, testing and reconditioning equipment: Specification and use of- torque wrench, pneumatic wrench, piston ring compressor and expander, piston ring filer, groove cleaner, scrapers,Valve lifter and valve spring tester, inside & outside micrometer, dial micrometer, cylinder bore gauge , cylinder boring machine and honing machine, crankshaft and camshaft grinding machine, connecting rod aligner, line boring machine, valve refacing, valve seat cutting and grinding machine, cylinder head refacing machine

UNIT-IV

TextBook(s):
[T2] Engineering metrology and instrumentation, R K Rajput, S K Kataria and Sons Publication

Reference Book(s):
[R1] Tune-up testing and performance – Ken Layne, Regents/Prentice Hall, 1993
5.GV.08 Suspension and Damping Systems

Unit I
Automotive chassis: Definition; chassis layout; types of chassis layout with reference to power plant location, steering position and drive on wheels; chassis components; chassis classification; Automotive frames: Construction; functions; load acting; materials; types; frame cross sections; frame diagnosis and service; dimensions of wheel base; wheel track; chassis overhang and ground clearance.

Unit II
Front axle & steering system: Functions, construction & types of front axle; front wheel geometry; front wheel drive; steering mechanisms; steering linkages & layout; types of steering gear boxes; power & power assisted steering; electronic steering; four-wheel steering; terminology-reversible steering, under- steering, over-steering, turning radius.

Unit III
Suspension system: Need; factors influencing ride comfort; types; suspension springs-leaf spring, coil spring & torsion bar; spring materials; independent suspension; rubber suspension; pneumatic suspension; hydraulic suspension, shock absorbers-liquid & gas filled.

Unit IV
Wheel: Forces acting on wheels, construction of wheel assembly, types- spoke, disc & built-up wheels; wheel balancing; wheel alignment; Tyres: Static & rolling properties of tyres, construction details, types of tyres- pneumatic & hydraulic; types of tyre-wear & their causes; tyre rotation. Bearings: Functions; classification of bearings; bearing materials; automotive bearings.

Books and References:

1. Automobile engineering", Dr. KripalSingh.
2. Automobile engineering" K.M.Gupta.

5.VP.04 Project

On the basis of learning in the vocational diploma, a project to be taken up by the student strengthening his/ her vocational skills
5. VP 05 Measurement Metrology lab

1. Measurement of angle with the help of sine bar/Vernier Bevel protractor.
2. Study and sketch of various types of optical 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.
13. Calibration of height gauge/depth gauge.
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.

5. VP 06 I.C. Engine lab

1. Study of Combustion Chambers shape and design.
2. Study & Overhaul of Fuel Injection Pumps
4. Study of Lubrication and faultfinding.
5. Dismantling & Study of Supercharges.
6. Dismantling & Study of Petrol engine Sump
7. Dismantling & Study of Diesel engine Sump
8. Dismantling & Study of Petrol engine cylinder head
9. Dismantling & Study of Diesel engine cylinder head
10. Study of wiring harness of engines.
UNIT-I
Tractors: Development of tractor- prominent makes in India, types of engines used, fuels used, horse power requirement, human factor in tractor design, traction theory, salient features of:- Tractor chassis, clutch, power transmission and final drive, steering, brakes and wheels, power takeoff-
drawbarworking,workingofhydraulicliftsystem,workingprincipleofautomaticdraft sensing and control system

UNIT-II

UNIT-III
Introduction of off Road Vehicles: Classification-their application, excavator: different types of shovel and dragline, their construction, operating principles. Production capacity and cost of production, transport equipment: various types of dumpers, main system, components and carrying capacity of dumper.

UNIT-IV
Road Making and Maintenance Machines: Different types of dozer, grader, and their construction. Operating principles, production capacity and application mechanism. Other equipment: scraper and front end loader, their construction and operation maintenance: maintenance aspect of off road vehicles.

Text Book(s):

Reference Book(s):
UNIT-I
Introduction to Engineering Design: Design methods, Aesthetic and Ergonomics consideration in design, Material properties and their uses in design, Manufacturing consideration in design, Design considerations of casting and forging, Basic principles of Machine Design, Modes of failures, Factor of safety, Design stresses, Principal stresses and strains, Theories of failures, Standards, I. S. codes, Preferred Series and Numbers.

UNIT-II

UNIT-III
Connecting rod: Length of rod, Cross section, Buckling, drilled connecting rods, piston pin bearing, offset connecting rods, effects of whipping, bearing materials, lubrication.

UNIT-IV
Crank Case, Crank shaft: Crank Case – General form of crank case, oil sumps and cooling features, flywheel mountings Crank shaft- Balance weights, local balance, Crankshaft proportions, oil holes drilled in crank shafts, balancing, vibration dampers, firing order, bearings, lubrication.

Text Book(s):

Reference Book(s):
UNIT-I
Introduction: define fuel economy, carbon footprint, factors affecting fuel economy, possible actions, alternative energy sources- hybrid in history, hybrid cars. Basic concept of electric traction, introduction to various electric drive train topologies.

UNIT-II
Drive train structure: Conventional drive train, parallel drive train, series hybrid Drivetrain, combined (split) hybrid, all-wheel drive hybrid, merits and demerits of different drive trains.

UNIT-III
Components of a hybrid electric drive train: Electric energy storage devices- lead acid, nickel based, lithium based batteries, merits and demerits of different type of batteries, battery wear, battery management, electrical machines, power electronics, electrified auxiliary system, additional mechanical devices- power split.

UNIT-IV
Case Studies: Design of a hybrid car, Design of an electric car

Text Book(s):

Reference Book(s):
6. GV 04 Engine Management Principles

Unit I-
ME-SFI voltage supply function, ME-SFI fuel ignition and injection system function, To measure the output voltage & to observe the output wave for mofa crank shaft sensor, To measure the output voltage & to observe the output wave form of a camshaft sensor, ME-SFI engine speed signal function.

Unit II-
Synchronizing fuel injection and firing order function, ME-SFI fuel supply function, ME-SFI fuel pump actuation function, ME-SFI consumption signal function, ME-SFI fuel reserve signal function, ME-SFI cam shaft adjustment function, ME-SFI electronic adjustment function, ME-SFI idle speed control function, ME-SFI throttle valve damping function, ME-SFI O2 sensor control function, ME-SFI oxygen sensor heating function.

Unit III-
Study of principle of working, application, location and effect of sensors- Cam shaft sensor, Crankshaft position sensor, coolant temperature sensor, air temperature sensor, HFM sensor, charge pressure sensor, accelerator pedal sensor, oil sensor. CDI ignition On function. CDI Turbo charging function.

Unit IV-
CDI Fuel supply function. CDI Main injection function. CDI Intel shut off part function. CDI Pre-glow function. CDI Start-up glowing and after- glowing function. CDI EGR function. CDI emission control function. CDI starting function. CDI idle speed/driving mode function. CDI start quantity control function. CDI Idle speed control function. CDI quantity control function. CDI anti jerk control function. CDI limiting full load injection quantity function.

2. Diesel Engine Management Bosch
UNIT I:
Course Introduction - Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education; Self Exploration – what is it? - its content and process; ‘Natural Acceptance’ and Experiential Validation - as the mechanism for self-exploration, Continuous Happiness and Prosperity - A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities - the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT II:
Understanding Harmony in the Human Being - Harmony in Myself!
Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’; Understanding the needs of Self (‘I’) and ‘Body’ - Sukh and Suvidha, Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer), Understanding the characteristics and activities of ‘I’ and harmony in ‘I’, Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.

UNIT III:
Understanding Harmony in the Family and Society - Harmony in Human Relationship:
Understanding Harmony in the family – the basic unit of human interaction Understanding values in human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals Visualizing a universal harmonious order in society - Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyavastha) - from family to world family!

UNIT IV:
Understanding Harmony in the Nature and Existence - Whole existence as Co-existence Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature, Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.

Reference Book:
1. The text book R.R Gaur, R Sangal, G PBagaria,
6 VP 01 Electric Vehicle lab

1. Study of hybrid vehicle.
2. Study of solar vehicle.
3. Study of an electric vehicle.
4. Study of fuel cell technology.
5. Study of regenerative braking system of a hybrid car.
6. Experiment on squirrel cage induction motor.
7. Study of lithium based batteries.
8. Study of Nickel based batteries.
9. Testing and maintenance of Lead Acid batteries.
10. Study of different Drive train structures.

6 VP 02 Engine Management Lab

1. Study of Crank shaft sensor.
2. Study of throttle valve function.
3. Study Air mass flow sensors.
4. Study of Fuel injection flow sensors.
5. Study of Refunction.
6. Study of cruise control and variable speed limiter function.
7. CDI Ignition On function.
8. Study of Accelerator pedal sensor
9. Study of coolant temperature sensor.
10. Air temperature Sensor study.
11. Study of turbo charging function
Level 6 (Semester IV)
06 GV 05 Autotronics

UNIT –I

UNIT –II
Automotive Sensors & Actuators: Types of sensors, actuators, Crankshaft position, camshaft position, manifold absolute pressure, Air flowrate sensor, Throttle position sensor, Inlet air temperature sensor, oxygen sensor, vehicle speed sensor, Wheel speed sensor, sensors for feedback control, engine control actuators, Solenoid actuators, motorized actuators.

UNIT –III
Automotive Electronic Systems: Electronic Ignition systems, Electronic injection systems, Antilock brake system circuit, Traction control, Electronic control of automobile transmission, Active suspension, EPS

UNIT –IV
Applications: Data Acquisitions- Temperature Control – Stepper Motor Control-Automotive Applications Engine Control, Suspension System Control, Driver Information Systems), Development of A High Speed, High Precision Learning Control System for the Engine Control. Programmable Logic Controls, Relay Logic Control, Motion Control.

Text Book(s):

Reference Book(s):
06 GV 06 Air-conditioning and Heating Systems

UNIT-I
**Refrigeration:** Principles of refrigeration, Performance parameters, Types of refrigeration systems, Study of simple Vapor compression refrigeration system, and System components, Applications of refrigeration- Need of transport refrigeration, introduction to food preservation, Types of transport refrigeration systems.

UNIT-II
**Refrigerants:** Definition, desired properties like thermodynamic, chemical & physical and classification. Selection of refrigerants, Effect on ozone depletion and global warming, introduction to alternative refrigerants.

UNIT-III
**Psychometric:** Psychometric properties of air, Use of Psychometric charts & tables, Representation, of psychometric processes on the chart such as heating and Cooling with humidification and dehumidification, adiabatic dehumidification, chemical dehumidification and mixing processes.

UNIT-IV
**Air conditioning- Heating Systems:** Factors contributing the Cooling/Heating in automobiles (car/bus). Concept of bypass factor, Sensible heat factor, Apparatus Dew Point, Room Sensible Heat Factor (RSHF), Gross Sensible Heat Factor (GSHF), summer, winter and year round air conditioning systems

Text Book(s):

Reference Book(s):
6 GV 07 Quality Management in Automobile Industry

Unit I
Introduction to Quality, Dimensions of Quality, Quality Planning, Concept and definition of quality cost, Determinants of Quality, Optimum cost of performance, Principles of TQM, Pillars of TQM, Introduction to leadership and Leadership roles, Quality council and Quality statement, Strategic Planning Process, Deming philosophy

Unit II
Input/output process Model, Juran trilogy, PDCA Cycle, 5–‘S’ Housekeeping principle, Kaizen Seven tools of Quality (Q-7 tools), Check Sheet, Histogram, Cause and effect diagram, Pereto diagram, Stratification analysis, Scatter diagram, Control charts, Control chart for variables & process capability, Control chart for attributes

Unit III
Affinity diagram, Relationship diagram, Tree diagram, Matrix diagram, Matrix data analysis, Arrow Diagram, Process decision programme chart (PDPC), Concept of bench marking, Reason to bench marking, Bench marking process, Types of bench marking, Benefits of bench marking

Unit IV
JIT philosophy, Three elements of JIT, Principles of JIT Manufacturing, JIT Manufacturing building blocks, JIT benefits, Kanban & 2 Bin Systems

Reference Books:
UNIT – I
Introduction: Importance of tyres, history, current status, functions of pneumatic tyres, applications, types of tyres, desirable tyre properties, classification of tyres based on carcass, tyre profile, geometry, sizing & designation, tyre components, principle of pneumatic tyre, requirements of pneumatic tyres.

UNIT – II
Tyre Design: General, motion forces, heat buildup, types of bonding, set of service conditions, tyre size requirements, and safety requirements: Tread design, general, role of foot print area and factors affecting tread life, various types of tread pattern. Carcass design, role of foot print area and factors affecting tread life, various types of tread pattern. Carcass design, role of various fibers used in carcass, estimation of number of piles, Bead design, single bead, multiple beads, and various configurations of wires in bead assembly.

UNIT – III
Manufacturing Technology: General introduction, role of various mixing ingredients, various recipes. Compound mixing, mixing equipment, extrusion of components, tyre cord, wire cord manufacture, calendering tyre manufacture, mold procurement, component preparation, green tyre building, pre curing, curing and post curing operations/treatments.

UNIT – IV
Tyre testing/ Evaluation Methods: General safety standards, carcass strength, resistance to bead unseating, machine simulation test, indoor laboratory testing, field-test on road, proving ground, latest testing techniques.

Text Book(s):
[T1] Tyre Technology- S.N. Chakravarty, Indian Rubber Institute
[T2] Tires, Encyclopedia of Chemical Technology- Kirk & Othmer

Reference Book(s):
[R1] Pneumatic Tyre Design- E.C. Wood, Cambridge
[R2] Tire Engineering- Kovac& Rodgers, Goodyear Tire Rubber Co., Ohio
6 AV 02 Environment and Ecology

Unit I

UNIT II
Basic concepts and definitions: ecology, landscape, habitat, ecozones, biosphere, ecosystems, ecosystem stability, resistance and resilience; autecology; synecology; major terrestrial biomes.

UNIT III
Types of ecosystem: forest, grassland, lentic, lotic, estuarine, marine, desert, wetlands; ecosystem structure and function; abiotic and biotic components of ecosystem; ecosystem boundary; ecosystem 19 function; ecosystem metabolism; primary production and models of energy flow; secondary production and trophic efficiency; ecosystem connections: food chain, food web; detritus pathway of energy flow and decomposition processes; ecological efficiencies; ecological pyramids: pyramids of number, biomass, and energy.

UNIT IV
Significant global environmental issues such as acid rain, climate change, and resource depletion; historical developments in cultural, social and economic issues related to land, forest, and water management in a global context; interface between environment and society

Reference Books

6 VP 03 Autotronics Lab

1. Study of electro- magnetic compatibility
2. Identify the various Electronic Dashboard Equipment
3. Use of onboard diagnostic system
4. Study of Security and warning system on vehicle
5. Study of solenoid actuators
6. Identify wheel speed sensor
7. Identify Air flow sensor
8. Identify Inlet temperature sensor
9. Identify Oxygen sensor
10. Study various types of relays

6 VP 04 Air conditioning Lab

1. Study of various methods of transport refrigeration systems.
2. Study components and layout of car & bus air conditioning systems.
3. Study of compressors used in automotive refrigeration and air-conditioning systems.
4. Study of condensers & Evaporators used in automotive refrigeration and air-conditioning system.
5. Study of expansion valves used in automotive refrigeration and air-conditioning systems
6. Study and demonstration of various controls in refrigeration (on refrigeration bench).
7. Trail on air conditioning system
8. Study and demonstration of air-conditioning charging methods.
9. Study and trial on vapor absorption system.
Level 7 (Semester V) Modern  
7 GV 01 Vehicle Technology

UNIT-I  
**Suspension Brakes and Safety**: Air Suspension–Closed Loop Suspension, Antiskid Braking System, Retarders, Regenerative Braking Safety Cage – Air Bags – Crash Resistance - Passenger Comfort.

UNIT-II  

UNIT-III  
**Advance Techniques in Traffic Management**: Vehicle & traffic navigation system, global positioning system, advanced traffic control devices, Intelligent Transport System.

UNIT-IV  
**Control systems in Automobiles**: Automotive application of sensors, Engine management systems, Electronic transmission control, Multiplex wiring systems, On-board navigation systems.

**Text Book(s):**

**Reference Book(s):**
UNIT-I
Locating and clamping devices: Concept, meaning and definitions of location and clamping, Use of locating and clamping principles in day-to-day supervision on shop floor, Degree of freedom-concept and importance, 3-2-1 principle of location, Locators-Types, Sketches with nomenclature, Working, Applications, Fool proofing and ejecting

UNIT-II
Types of layout problems, the layout function, organization of layout. Analysis and Design of Material Flow: Systems approach to flow cycle, process charts, flow process charts, Quantitative analysis of material flow; optimal material flow configuration. Space and Area Allocation for Production and Physical Plant Services;

UNIT-III
Design of system configurations conforming to various kinds of product features and layout characteristics; Design concepts of common handling and transfer equipment; Different types of conveyors, elevators, forklifters;

UNIT-IV
Design concept of warehouse facilities commensurate with adopted kind of handling and transfer devices; Automated Handling of materials, Automated Transfer lines, AGVS, Use of Robots in Product handling, automated packaging devices.

Reference Book(s):
1. Assembly Line Planning and Control Nick T. Thomopoulos Springer
2. Plant Layout and Materials Handling, R. B. Choudhary, G. R. N. Tagore
UNIT –I
**Automotive vehicle testing for Safety:** Introduction to active & passive vehicle safety systems, occupant safety system- seat belts and belttighteners, front air bag, side air bag, rollover protection system

UNIT –II
Braking test (asperIS11852-2001), ABS performance & Traction control test Seatbelt anchorage testing, Horn, lighting installation and mirror, test.

UNIT –III
**Collapsible steering column testing:** Frontal crash test, side door intrusion, interior and exterior test. Body block test (S-11939-1996), Introduction to the offset, Frontal impact test (IS-11939-1996 & (ECE94), Lateral Impact(ECER95),AIS-029:Survivalspaceforoccupants,pedestrianprotectiontest and other upcoming standards.

UNIT –IV

Text Book(s):

Reference Book(s):
UNIT-I
Introduce the concepts relating to Noise. Vibration and Harshness (NVH): Define NVH terminology, necessity for NVH diagnosis, Concepts of the transmission of vibration and sound, concepts of preventing excessive vibration and noise. Develop skills in associating NVH symptoms to the: Sensation, Frequency range, operating conditions, Causes, Vibrating system.

UNIT-II
Vibration- Characteristics of vibration, Oscillation, Cycle, Dissipation of Energy from a Single Impact, Sensors Signal, Calculating Component Frequency, Amplitude, vibration measurement, Natural frequency, Resonance resonance point, resonance graph (frequency – vehicle speed), Dampers,

UNIT-III

UNIT-IV
Harshness, transmission path of harshness, NVH in Automobiles- Engine, Driveline, wheels , Common NVH Symptoms, causes and remedies for- Body Shake, Steering Flutter and Shimmy, Accelerator pedal vibration, Shift lever vibration, Harshness, Road noise, Tire pattern noise, Body Booming noise, Engine noise, Body Beating noise, Transmission gear whine, differential whine, clutch judder, brake vibration, brake squeak.

Text Book(s):

Reference Book(s):
7 AV 01 INDIAN CONSTITUTION

UNIT I
Constitution’ meaning of the term, Indian Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy

UNIT II
Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha

UNIT III
Governor: Role and Position, CM and Council of ministers, State Secretariat: Organization, Structure and Functions

UNIT IV
District’s Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO ZilaPachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

References
1. ‘Indian Polity’ by Laxmikanth
2. ‘Indian Administration’ by Subhash Kashyap
3. ‘Indian Constitution’ by D.D.Basu
4. ‘Indian Administration’ by Avasti and Avasti
7 VP 01 Elements of Noise, Vibration & Harshness Control Lab

1. Demonstration of washing & greasing of vehicle
2. Chassis Greasing of light / heavy duty vehicle
3. Engine oil change & periodic maintenance of vehicle
4. Clutch overhaul of light / heavy duty vehicle
5. Suspension steering overhaul of light / heavy duty vehicle
6. Dismantling & assembly of constant mesh gear box
7. Dismantling & assembly of synchro mesh gear box
8. Drive line overhaul (universal joint, propeller shaft, slip joint)
9. Final drive & differential overhaul
10. Rear axle hub greasing
11. Door adjustments.

7 VP 02 Modern Vehicle Technology Lab

1. Study air suspension system and its application.
2. Study Antiskid Braking System.
3. Study Regenerative Braking system.
4. Study Hydrogen Engines.
5. Study Intelligent Transport System.
6. Identification and function of different sensors.
7. Study multiplex wiring system.
8. Study engine management system of a petrol car.
9. Study engine management system of a heavy duty vehicle.
10. Practice on-board testing of a modern car.
Level 7 (Semester VI)

7 GV 05 Automobile Servicing

UNIT-I
Importance of maintenance, types– preventive (scheduled) and breakdown (unscheduled) maintenance, requirements of maintenance, preparation of check lists, Inspection schedules. Safety precautions in maintenance. Knowledge of free and paid service schedules, fault diagnosis, job cards, warranty procedures, log sheets and other forms.

UNIT-II
Lubrication system – lubricating/ engine oil top up, oil changing, cleaning methods, visual and dimensional inspections, minor/major adjustments of various components, maintenance of engine accessories- air filter, battery, cooling system, electrical wiring in engine compartment. Engine tune up, top overhauling, dismantling of engine components, cleaning, visual and dimensional inspections, minor/major reconditioning of various components, reconditioning methods, engine assembly, special tools used for maintenance/ overhauling. Servicing and maintenance of cooling systems, lubrication system.

UNIT-III
Maintenance of other assemblies: lubrication system – lubricating/ gear oil top up, oil changing, cleaning methods, visual and dimensional inspections, minor/major adjustments of various components of transmission system, Servicing and maintenance of clutch, gear box, propeller shaft, differential. Servicing and maintenance of suspension system, brake system, steering system, wheel alignment and wheel balancing.

UNIT-IV
Electrical System Maintenance
Checking of electrical components for functioning, checking of battery, electrolyte top up, terminal cleaning & protection methods, checking of starter motor, checking of charging systems, fan belt tension checking and adjustment. Testing methods for checking of ignitions system, lighting system, fault diagnosis and maintenance of modern electronic controls, checking and servicing of dash board instruments.

Text Book(s):

Reference Book(s):
[R5] Dr. Kirpal Singh, “Automobile Engineering” (Vol-1), Standard Publisher Distributors
UNIT I
Study of physics of driving Vehicle Kinematics terms Study in detail the function, task and location of different components of ESP.

UNIT II
Study the function location and task of the lateral acceleration sensor, Study the function of Yaw rate sensor, Input singles to ESP control unit.

UNIT III
Output signals or ESP control unit, Function of ESP if vehicle under steers and over steers during left cornering and during braking in the right side curve, Study of ASR functions: Brake torque control and drive torque control.

UNIT IV
Study of brake booster with BAS, understanding function of BAS. Understanding BAS operating conditions, to study function and task of ABS.

Reference
1. Car owner manual
2. Workshop Information Systems
UNIT I

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge through indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge through formal knowledge

UNIT II

Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

UNIT III

Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

UNIT IV

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

References:

2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, PratibhaPrakashan 2012.
3. VN Jha (Eng. Trans.), Tarkasangraha of Annam Bhatta, International Chinmay Foundation, Velliarnad, Arnakulam
4. Yoga Sutra of Patanjali, Ramkrishna Mission, Kolkata

7 VP 03 Major Project

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