

# Vidyasagar University

## Curriculum for Automobile Maintenance (Major) [Choice Based Credit System]

### Semester-I

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
<b>CC1</b>		<b>C1T:</b> Principles of Automobiles	Core Course-1	4	0	0	6	75
		<b>C1P:</b> Principles of Automobiles		0	0	4		
<b>CC2</b>		<b>C2T:</b> Constructional details and working of I.C engines	Core Course-2	4	0	0	6	75
		<b>C2P:</b> Constructional details and working of I.C engines		0	0	4		
<b>GE1</b>		<b>TBD</b>	Generic Elective-1				4/5	75
						2/1		
<b>AECC</b>		English	AECC (Elective)	1	1	0	2	50
<b>Semester Total</b>							<b>20</b>	<b>275</b>

**L**=Lecture, **T**=Tutorial, **P**=Practical, **CC**=Core Course, **TBD** = To be decided, **AECC**=Ability Enhancement Compulsory Course

**Generic Elective (GE)** (Interdisciplinary) from other Department [Paper will be of 6 credits]. Papers are to be taken from following discipline: Physics/Electronics/Mathematics/Computer Science/Economics

**Modalities of selection of Generic Electives (GE):** A student shall have to choose **04** Generic Elective (**GE1 to GE4**) strictly from **02** subjects / disciplines of choice taking exactly **02** courses from each subjects of disciplines. Such a student shall have to study the curriculum of Generic Elective (**GE**) of a subject or discipline specified for the relevant semester.

## **SEMESTER-I**

### **Core Course (CC)**

**CC-1: Principles of Automobiles**

**Credits 06**

**C1T: Principles of Automobiles**

**Credits 04**

#### **Principles of Automobiles:**

##### **Unit-I:**

Basic concept of thermodynamics, 1st and 2nd laws, reversible, irreversible process and adiabatic, Isothermal Process. Thermodynamic Cycle: Carnot, Otto, Diesel, Dual cycles and their air standard efficiency, Numerical Problems.

##### **Unit-II:**

Classification of I.C Engines, S.I. and C.I Engines, 2 Stroke, 4-Stroke engines and their working Principle.

##### **Unit-III:**

Engine specifications-Bore, Stroke-length, MEP, I.H.P, B.H.P, S.F.C, mechanical and thermal efficiencies.

##### **Unit-IV:**

Valve timing diagram-2-stroke and 4 stroke engine.

##### **Unit-V:**

Fuel used in I.C Engines, Properties of Fuel, Petrol and Diesel, Fuel additives and- fuel rating (Octane and cetane numbers)

##### **Unit-VI:**

Combustion Process in I.C engines Auto ignition and chemical reaction, pre-ignition MAN and open combustion chambers, effect of knocking, calorific value of fuels, requirement of oxygen for complete combustion.

##### **Unit-VII:**

Stress, strain, their types, Numerical problems on principle of stresses,

**CIP: Principles of Automobiles**

**Credits 02**

### **Practical**

#### **Unit-I**

##### **Engineering drawing:**

Scales, projections of solid, surface developments, Isometric and oblique views, elevations, plans and end views off different objects and design.

#### **Unit-II**

##### **2-stroke and 4 stroke (C.I &S.I engine):**

Valve, Valve seat, Rocker arm, Push rod, Cam shaft, Crank shaft, Piston, piston ring, Connecting rod, Oil pump, fuel pump, Distributor, Oil filter, Fuel filter, Starter motor, alternator, Dynamo, Solex carburettor, inlet manifold, exhaust manifold, water pump, fly-wheel, vibration damper, spark plug, heater plug, injector, F.I.P pump. Adjustment:- C.B point, piston ring joined, piston ring groove, Cylinder bore, fan belt adjustment, valve tappet.

#### **Unit-III**

**Cooling system:** Radiator cleaning, thermostat valve, testing fan valve adjust, water pump service, pressure cap testing, over hauling viscous fan.

#### **Unit-IV**

Electrical safety precaution ,Electrical hand tools, Electrical measuring instrument practice(Volt Metre, Ammeter, Ohm metre, AVO Metre ), Wire cutting and joint practice (Basic wire joints, soldering, Lug joint ), Wire checking, use of terminal block, Magnetic effect of current, Practice using relay.

## **CC-2: Constructional details and working of I.C engines**

**Credits 06**

### **C2T: Constructional details and working of I.C engines**

**Credits 04**

#### **Theory:**

##### **Constructional details and working of I.C engines:**

**Unit-I: Layout of an automobile:** Main Components and assemblies.

**Unit-II:** Constructional features and functions of 2& 4 wheelers, Cylinder block, Crankcase, Cylinder head, Oil Pump, Gasket, Crank Shaft, Main Bearing, Vibration dampers, Exhaust system, Inlet and exhaust manifolds, fly-whell, Piston, Piston rings, Piston Pin, Connecting rod, Cams and Camshaft, Valve and Valve mechanism.

##### **Unit-III:**

**S.I Engines:** Combustion process, types of fuel feed system, various components of fuel system, fuel tank, fuel filters and screens, fuel losses, fuel gauges, fuel pumps, air cleaners, carburettor and its working its working, trouble shooting, servicing adjustments and M.P.F.I system.

##### **Unit- IV:**

**C.I engines:** Combustion and combustion chambers, fuel injection system, fuel tanks, fuel feed pumps, fuel injectors, nozzles and their types, details of nozzles and fuel injector unit, CRDI system.

##### **Unit-V:**

**Cooling System:** Importance, types, various components and accessories with troubles shooting.

##### **Unit-VI:**

**Lubrication system:** Importance, lubricants and their properties, their selections, lubrication system and their working, filters, lubrications in other parts of an automobiles, trouble shooting.

## **C2P: Constructional details and working of I.C engines**

**Credits 02**

### **Practical**

#### **Unit-I**

##### **Fuel system (Petrol engine):**

Over hauling fuel pump, carburettor, fuel fitter and air cleaner, practice in engine tune up in a vehicle.

#### **Unit-II**

##### **Lubrication system:**

Oil pump over-hauling and refitting, Replacing oil filter, Drawing engine oil, Repairs oil galleries.

#### **Unit-III**

##### **Fuel system (Diesel engine):**

Fuel feed pump over hauling, F.I.P pump single & multi cylinder over hauling, over hauling injector, testing the injector, Fuel bleeding, cleaning the injector.

#### **Unit-IV**

Basic idea and details of fitting shop, First aid, 5S concept, fire, Measuring instruments, Gauge Measurement, Cutting tool's Operation, Heat Treatment, Drill and Grinding Machine Operation.

### **Job training or garage practice**

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# Vidyasagar University

## Curriculum for Automobile Maintenance (Major) [Choice Based Credit System]

### Semester-II

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
<b>CC3</b>		<b>C3T:</b> Theory of Machine	Core Course-3	4	0	0	6	75
		<b>C3P:</b> Practical		0	0	4		
<b>CC4</b>		<b>C4T:</b> Suspension system, Steering system, Ignition system and Auto Air conditioning	Core Course-4	4	0	0	6	75
		<b>C4P:</b> Practical		0	0	4		
<b>GE2</b>		<b>TBD</b>	Generic Elective-2				4/5	75
						2/1		
<b>AECC</b>		ENVS	AECC (Elective)				4	100
<b>Semester Total</b>							<b>22</b>	<b>325</b>

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**Generic Elective (GE)** (Interdisciplinary) from other Department [Paper will be of 6 credits]. Papers are to be taken from following discipline: **Physics/Electronics/Mathematics/Computer Science/Economics**

**Modalities of selection of Generic Electives (GE):** A student shall have to choose **04** Generic Elective (**GE1 to GE4**) strictly from **02** subjects / disciplines of choice taking exactly **02** courses from each subjects of disciplines. Such a student shall have to study the curriculum of Generic Elective (**GE**) of a subject or discipline specified for the relevant semester.

**SEMESTER-II**  
**Core Course (CC)**

**CC-3: Theory of Machine**

**Credits 06**

**C3T: Theory of Machine**

**Credits 04**

**Course Contents:**

**Theory of Machine:**

**Unit-I:** Friction: Introduction, types of friction, coefficient of friction, limiting friction, laws of solid friction and kinetic friction, screw jack.

**Unit-II:** Belt, Rope and Chain Drive: Introduction, Belt drive, types of belts, Materials used, Velocity ratio, Slip, Length of belt, Comparison, flat and v-belt, Rope drive & Chain Drive.

**Unit-III:** Gear and Gear Trains: Fundamental laws of gearing, spur, bevel and worm gears, gear train, Interference, epicyclic gear trains.

**Unit-IV:** Cam: Types, displacement diagrams.

**Unit-V:** Flywheels: Turning moment diagrams, fluctuations of energy and speed.

**Unit-VI:** Governors: Types, Principles, working, Characteristics and performance.

**Unit-VII:** Torsion and torsional effect, Shear force and bending moment diagram, bending stress.

**C3P: Practical**

**Credits 02**

**Unit-I**

Valve timing: C.I. & S.I. valve timing adjustment of 2-stroke & 4-stroke.

**Unit-II**

Firing order set (Multi cylinder S.I. & C.I. 4-stroke) petrol- tappet timing, gear timing, chain timing, ignition timing. Diesel- tappet timing, gear timing, fuel timing.

**Unit-III**

Electronics components checking (Resistor, Capacitor, Diode, Transistor, and I.C), Construction of D.C Generator, Starter motor, Wiper Motor, Alternator, Transformer.

**CC-4: Suspension system, Steering system, Ignition system and Auto Air conditioning**

**Credits 06**

**C4T: Suspension system, Steering system, Ignition system and Auto Air conditioning**

**Credits 04**

**Course Contents:**

**Unit-I :** Suspension system:- Objectives, principles of working, types of suspension system, independent and rigid axle suspension system, shock absorber and damper, troubles in a suspension system.

**Unit-II:** Steering system:- Steering geometry, their effect, steering angle, steering mechanism, steering linkages, power steering , trouble shooting.

**Unit-III:** Ignition System: Battery, electrical, magneto and electronic ignition systems and their troubles.

**Unit-IV:** Auto Air conditioning: Introduction, Air conditioning system, components, effect of Air conditioning of fuel economy, car Air conditioning system, Truck Air conditioning, trouble shooting.

**C4P: Practical**

**Credits 02**

**Unit-I**

**Suspension system:** Replacing shock absorber, servicing shackle, over hauling leaf spring, over hauling coil spring, over hauling front suspension system.

**Unit-II**

**Spark plug cleaning and testing:** Spark plug cleaning, spark plug gap setting and spark plug testing.

**Unit-III**

Use of general hand tools (Vice, Screw driver, Spanner, Pliers etc. ), identify of various types (Bolts, Nuts, Washers, Keys, pins, Bearing, Pulley , Gear etc.), Limit, Fit and Tolerance, Transmission of power.

**Unit-IV**

Practice to Operate the lathe machine tools , Welding(Arc), sheet metal work and Forging.

**Job training or Garage practice**

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