

# Vidyasagar University

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

### Semester-V

Course	Course Code	Name of the Subjects	Course Type / Natu	Teaching Scheme in hour per			Credit	Marks
				Week	T	P		
CC- 11		C11T: Electrical	Core Course-11	4	0	0	6	75
		System Lab		0	0	4		
CC- 12		C12T: Estimating, Costing and Machine Design	Core Course-12	5	1	0	6	75
DSE-1		TBD	Discipline Specific Elective -1	4	0	0	6	75
				0	0	4		
DSE-2		TBD	Discipline Specific Elective -1	4	0	0	6	75
				0	0	4		
Semester - 2							24	300
Semester Total								

**L= Lecture, T= Tutorial, P = Practical, CC - Core Course, TBD - To be decided, DSE: Discipline Specific Elective.**

## **SEMESTER- V**

### **List of Core Course (CC)**

**CC-11: Electrical System**

**CC-12: Estimating, Costing and Machine Design**

### **Discipline Specific Electives (DSE)**

**DSE-1: Computer Integrated Manufacturing**

**Or**

**DSE-1: Alternate Fuels and Energy Systems**

**DSE-2: Motor Vehicle Act & Pollution Control**

**Or**

**DSE-2: Urban Transportation Requirement and Planning**

## Core Course (CC)

**CC-11: Electrical System**

**Credits 06**

**C11T : Electrical System**

**Credits 04**

### **Course Contents:**

#### **Unit-I : Generator, Alternator and Batteries, Maintenance**

Various electrical Instruments in an automobile, Automobile batteries and its maintenance and function of generator, alternator, battery charging system, voltage and current regulator, self-starter and bendix drive, ignition system and its components, ignition timing, setting of contact breaker gap, spark plug, firing order, checking electrical system.

#### **Unit – II: Lighting System**

Concept of Wiring system, wiring diagram, colour coding with diagram.

#### **Unit-III: Accessories and control**

Horn and its type, wind screens, wiper, direction indicators and flashing units, signalling system, lamps and their types, starter switch, Speedo meter, Antitheft devices, fuel gauge, oil pressure gauge, Temperature gauge.

**C11P: Electrical System (Practical)**

**Credits 02**

### **Practical**

#### **01. Disassemble the engine component:**

Overhauling cylinder head rockenarm piston, connecting rod, crankshaft pulley, timing geals-chain, fly wheel, crank shaft, of multi-cylinder engine. Injector testing with bench tester Fresing and calibration of diesel engine

#### **02. Electrical system**

Battery, battery testing, ignition circuit, lighting circuit, battery charging circuit, dynamo circuit, alternator circuit, Overhauling starter motor, dynamo alternator, Wiper motors, horn operation

#### **03. M.P.F.I system**

Fuel pump overhauling, common rail service, injector testing and service, M.P.F.I Total Sensor System, Fuel line service. . Bleed air from the fuel lines

#### **04. ECU**

Carryout Identification of Electronic control Unit, Perform Set up for testing, Testing of Electronic Control Circuit. Perform Identification of various sensors installed in engine & it's

mounting. Check instruments & Gauges on dash board & replace defective gauges. Test Temperature sensor, Pressure sensor, potentiometer, magnetic induction sensor, cam shaft sensor, crankshaft position sensor and all sensor

#### **05. Turbocharger & super charger**

Overhauling turbo charger & supercharger unit, impeller shaft inspect and impeller service.

#### **06. Total light circuit**

Trace the light circuit - test bulbs, align head lamps, aiming headlights. Changing a headlight bulb, checking of a head light switch and to replace if faulty. Check the all wiring wire with MultiMate, service head light, fog light, indicator light, parking light, break light tell light, check ignition switch

### **CC- 12: Estimating, Costing and Machine Design**

**Credits 06**

#### **C12T: Estimating, Costing and Machine Design**

**Credits 06**

#### **Course Contents:**

##### **Unit-I: Estimating and Costing**

Definition of estimating and costing, elements of costing, Determination of weight of various parts such as block, cylinder, nuts, bolts, rivets, Estimate of machining price of several parts.

##### **Unit-II: Machine Design**

Concept and definition of machine Design, Types of stress, strain such as tension, compression, shear, bearing pressure.

##### **Unit-III: Design of simple machine parts**

Design of Rivets joint such as single rivet lap joint, Double rivet lap joint, single rivet butt joint, Double rivet butt joint. Flange coupling, universal coupling, Gears.

#### **Suggested Books/ Reading:**

- Auto Electrical Technology-A.K.Babu, Tom Delton
- Industrial Management- Bhadra & Roy
- Machine Design- J.K Gupta, V.B Bhandari, R.B Gupta

### **Discipline Specific Electives (DSE)**

## **DSE-1: Computer Integrated Manufacturing**

**Credits 06**

### **DSE1T: Computer Integrated Manufacturing**

**Credits 04**

#### **Course Contents:**

#### **Unit-I: Concept of Computer Integrated Manufacturing (CIM)**

Basic components of CIM, Distributed database system, distributed communication system, computer networks for manufacturing; future automated factory.

#### **Unit-II: Computer Aided Design (CAD)**

CAD hardware and software, product modeling, automatic drafting, engineering analysis, FEM design review and evaluation.

#### **Unit-III: Computer Aided Manufacturing (CAM)**

Computer assisted NC part programming; Computer assisted robot programming, computer aided process planning (CAPP), computer aided material requirements planning (MRP), computer aided production scheduling, computer aided inspection planning, computer aided inventory planning, flexible manufacturing system (FMS), concept of flexible manufacturing, Integrating NC machines, robots, AGVs, and other NC equipment, Computer aided quality control, business functions, computer aided forecasting.

### **DSE-1P: Computer Integrated Manufacturing (practical)**

**Credits 02**

1. Designing practical using CAD software.
2. Practical on CAM - examples.
3. Project work

#### **Suggested Books/ Readings**

1. CAD, CAM, CIM by P.Radhakrishnan and S.Subramanyan, New Age International Publishers.
2. Computer Integrated Manufacturing by Paul G. Rankey, Prentice Hall.
3. Computer Integrated Manufacturing by Harrington J. Jr., Industrial Press, Inc., New York.
4. Computer Integrated Manufacturing by K.Rathmill and P.Macconal, IFS Publications.
5. Automation, Production Systems and Computer Integrated Manufacturing by M. P. Groover, Prentice Hall.

**Or**

## **DSE-1: Alternate Fuels and Energy Systems**

**Credits 06**

### **DSE1T: Alternate Fuels and Energy Systems**

**Credits 04**

#### **Course Contents:**

#### **Unit-I: Introduction to alternate fuels and energy systems:**

Estimation of petroleum reserve; Need for alternate fuel; Availability and properties of alternate fuels; general use of alcohols, LPG, Hydrogen, Ammonia, CNG, and LNG; Vegetable oils and Biogas; Merits and demerits of various alternate fuels.

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

Properties as engine fuels; alcohols and gasoline blends; Combustion characteristics in engines; emission characteristics.

#### **Unit-III: Natural Gas, LPG, Hydrogen and Biogas**

Availability of CNG, properties modification required to use in engines-performance and emission characteristics of CNG using LPG in SI & CI engines. Performance and emission for LPG, Hydrogen; Storage and handling, performance and safety aspects; Vegetable Oils - Various vegetable oils for engines, esterification, performance and emission characteristics

#### **Unit-IV: Electrical and Solar Powered Vehicles:**

Layout of an electric vehicle, Advantage and limitations, Specifications-System component, Electronic control system-High energy and power density batteries, Hybrid vehicle, Solar powered vehicles

### **DSE-1P: Alternate Fuels and Energy Systems (practical)**

**Credits 02**

1. Physical demonstration of engines powered with alternative fuels/ energies
2. Perform Checking of petroleum and alternate fuel engine
3. Training on Solar/ Electrical powered vehicle.
4. Laboratory note book and Viva Voce: Students will be required to maintain records of all works done in connection with the topic taught in this paper.
5. Visit to industry / Project work

#### **Suggested Books/ Readings**

1. Maheswar Dayal, Energy today & tomorrow, I & B Horishr India,1982
2. Nagpal, Power Plant Engineering, Khanna Publishers,1991.
3. Alcohols and Motor fuels progress in technology, Series No.19,SAEPublicartion USA 1980.
4. SAE paper Nos.840367, 841156,841333,841334.
5. The properties and performance of modern alternate fuels SAE paper No 841210.

6. Bechtold.R.L. Alternative Fuels Guide Book, SAE, 1997.

## **DSE- 2: Motor Vehicle Act & Pollution Control**

**Credits 06**

### **DSE2T: Motor Vehicle Act & Pollution Control**

**Credits 04**

#### **Course Contents:**

##### **Unit I: Motor vehicle act**

Various section of the motor vehicle act, Licensing of drivers of motor vehicles, Registration of motor vehicles, Control of transport vehicles, Control of traffic, Insurance of motor vehicles, Offence - Penalties and Procedure, Mandatory signs, Accident claims, Accident claims tribunals.

##### **Unit II: Introduction**

Vehicle population assessment in metropolitan cities and contribution to pollution, effects on human health and environment, global warming, types of emission, transient operational effects on pollution.

##### **Unit III: Pollutant Formation in SI Engines**

Pollutant formation in SI Engines, mechanism of HC and CO formation in four stroke and two stroke SI engines, NO<sub>x</sub> formation in SI engines, effects of design and operating variables on emission formation, control of evaporative emission. Two stroke engine pollution.

##### **Unit IV: Pollutant Formation in CI Engines**

Pollutant formation in CI engines, smoke and particulate emissions in CI engines, effects of design and operating variables on CI engine emissions, No<sub>x</sub> formation and control. Noise pollution from automobiles, measurement and standards

##### **Unit V: Measurement Techniques Emission Standards and Test Procedure**

NDIR, FID, Chemiluminescent analyzers, Gas Chromatograph, smoke meters, emission standards, driving cycles - USA, Japan, Euro and India. Test procedures - ECE, FTP Tests. SHED Test - chassis dynamometers, dilution tunnels

### **DSE2P: Motor Vehicle Act & Pollution Control (Practical)**

**Credits 02**

#### **List of Practical**

1. Identification of Informatory, Warning and Mandatory Road Signs.
2. Knowing various traffic signals.
3. Familiarising with layout and identifying various items and parts of various emission controlling system e.g :-EGR system, Cat Con , PCV System and Fuel vapour Purge Control System.
4. Laboratory note book and Viva Voce.

**Or**

## **DSE-2: Urban Transportation Requirement & Planning**

**Credits 06**

### **DSE2T: Urban Transportation Requirement & Planning**

**Credits 04**

#### **Course Contents:**

##### **Unit 1: Urban Transportation System Planning**

- Role of transportation in urban development
- Transportation problems in urban areas
- Purpose of transportation planning
- Transportation planning process and factors affecting it
- Travel demand and actors affecting it
- Urban transport forecasting

##### **Unit 2: Transportation Surveys**

- Study area and zoning
- Survey Types: Home interview surveys, Commercial vehicle surveys, Taxi surveys, Road side interview surveys, Post card questionnaire surveys, Registration number surveys, Tag surveys, Public transport surveys, Telephone surveys.
- Inventory of existing transport Facilities

##### **Unit 3: Trip Generation and Distribution**

- Trip generation: Trip purpose, Problems of trip generation
- Factors governing trip generation and attraction rates
- Trip distribution
- Methods of trip distribution: Uniform factor, Average factor, Detroit, Fratar, Furness and Time factor method
- Problems based on trip distribution

##### **Unit 4: Transportation Plan Preparation**

- Definitions: corridor, corridor traffic forecasting, corridor traffic study, count, segment, point, segment capacity, screen line
- Corridor identification
- Mass transit system
- Urban mass rapid transit system
- Rail based transit – Metro, Light rail transit system (LRT), Mono rail, Sky rail
- Road based transit – Bus rapid transit system (BRTS), Electric trolley bus, commuter Bus / City

## **DSE2P: Urban Transportation Requirement & Planning (Practical)**

**Credits 02**



### **List of Practical:**

- Identifying problems like parking, delay at intersection - students will make a brief report regarding problems.
- Make any two transport survey and prepare a report of outcome.
- Prepare write up on transportation planning process.
- Model project on Urban mass rapid transit system.

### **Suggested Books/ Readings**

1. Kadiyali, L. R., Traffic Engineering and Transportation Planning, Khanna Publishers, New Delhi
2. Hutchison, B. G., Introduction to Transportation Engg and Planning, McGraw-Hill Book Co.
3. Morlok, Edward K., Introduction to Transportation Engg. and Planning. McGraw-Hill Book Co.
4. Vuchic, Vukan R, Urban Public Transit System and Technology, PHI Learning, New Delhi
5. The properties and performance of modern alternate fuels SAE paper No 841210.
6. Dickey, John W. Metropolitan Transportation Planning, McGraw-Hill Book Co.

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