

# Vidyasagar University

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

### Semester-III

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
CC-5		C5T: Transmission system Part -I	Core Course - 5	4	0	0	6	75
		C5P: Lab		0	0	4		
CC-6		C6T: Transmission System Part –II	Core Course - 6	4	0	0	6	75
		C6P: Lab		0	0	4		
CC-7		C7T: Manufacturing process or Production Engineering - 1	Core Course - 7	4	0	0	6	75
		C7P: Lab		0	0	4		
GE-3		TBD	Generic Elective -3				4/5	75
							2/1	
SEC-1		SEC1T: Assembling Simple Electronics Circuits	Skill Enhancement Course-1	1	1	0	2	50
<b>Semester Total</b>							<b>26</b>	<b>350</b>

**L**=Lecture, **T**= Tutorial, **P**=Practical, **CC** = Core Course, **GE**= Generic Elective, **SEC** = Skill Enhancement Course, **TBD** = to be decided

**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

**SEMESTER-III**

**Core Course (CC)**

**CC-5: Transmission system Part -I**

**Credits 06**

**C5T: Transmission system Part –I**

**Credits 04**

**Course Contents:**

**Unit-I:** General principle, objectives and types (Manual, Semi-automatic, Automatic, Hydraulic transmission)

**Unit-II:** Gear boxes, resistance to motion of a vehicle, power required for propulsion

**Unit-III:** acceleration and hill climbing, necessity of gear box, function and types of gears, synchromesh gear box, free wheel drive, gear lubrication, transmission troubles.

**C5P: Practical**

**Credits 02**

1. Over hauling, sliding mesh, constant mesh and synchromesh gear box and other gear box.
2. Moulds – Describe of Mould materials, Types of sand, Sand moulding, Pit moulding, machine moulding.
3. Melting practice. Types of furnaces with specific application Cupola furnace, Electric arc furnace.
4. Special casting processes die casting, centrifugal casting, investment casting, Shell moulding
5. Casting defects & its remedies. Green sand mould making process
6. Patterns - Material used, types, Patterns allowances, Cores, Core allowances. Core Prints.

**CC-6: Transmission System Part –II**

**Credits 06**

**C6T: Transmission System Part -II**

**Credits 04**

**Course Contents:**

**Unit-I** Clutch System: Function, types, clutch linkage, clutch facing & friction material, common faults.

**Unit-II:** Propeller Shaft: Types, fluid drives, Hotchkiss drive, universal & slip joint, Torque convertors.

**Unit-III:** Final drive and rear axle: Types of final drives, differential gears and its principles of operation, rear axle and its types.

**Unit- IV:** Front Axle: Types and their components, swivelling mechanism, front form of motor cycle.

**C6P: Practical**

**Credits 02**

1. Clutch: Overhauling single plate, multi plate, diaphragm clutch and other clutch.
2. Steering System and power steering: Overhauling steering linkage, steering gear box adjustment, power steering overhauling.
3. Servicing tyre: Repairing tube and tyre puncture.

**CC-7: Manufacturing process or Production Engineering - 1**

**Credits 06**

**C7T: Manufacturing process or Production Engineering - 1**

**Credits 04**

**Course Contents:**

**Unit-I:**

Mechanical properties of metals, ferrous and non ferrous metals used in engineering practice, Influence of carbon on iron and steel. Heat treatment of metals-different process-heat treatment equipments and materials.

**Unit-II:**

Hand tools used in different shops, bench work and fitting shop, Hand tools used in fitting shops, chipping, filing, scraping, measuring tools and gauges, limit, fit, allowance and clearance, jig stand and fixtures.

**Unit-III:**

Definition and concept of different mechanical process like rolling, drawing, spinning, firing, casting, welding, brazing, and soldering.

**Unit-IV:** Machine shops- Elementary ideas about different machines like Lathe, Shaper, Grinder, Drill & Milling.

**C7P: Practical**

**Credits 02**

1. Forgeable material and forgeability, forging temperature, Grain flow in forged parts, Types of Presses and hammers.
2. Forging Processes – Drop forging, Upset forging, Die forging or press forging. Hot working & Cold working.
3. Types of dies - Open Die, Closed Die (Single Impression and Multi impression) Closed Die forging operations - Fullering, Edging, Bending, Blocking, Finishing.
4. Types of rolling mills: 2 Hi, 3 Hi & 4 Hi mills. Different rolled sections.

**SEC-1: Assembling Simple Electronics Circuits**

**Credits 02**

**SEC1T: Assembling Simple Electronics Circuits**

**Course Contents:**

**Unit- 1: Semiconductor and Diode**

P-type and N-type semiconductor, Junction of P-type & N type i.e. PN junction, Barrier voltage , depletion region ,Junction Capacitance, Forward biased & reversed biased junction, Diode symbol ,circuit diagram for characteristics (forward & reversed),Characteristics of PN junction diode, Specifications:-Forward voltage drop , Reversed saturation current, maximum forward current , power dissipation, Package view of diodes of different power ratings (to be shown during practical hours) Zener diode: Construction, Symbol, Circuit diagram for characteristics of zener diode (Forward & Reverse),Zener & Avalanche Breakdown, Zener diode specifications – zener voltage, power dissipation, break over current, dynamic resistance & maximum reverse current.

**Unit- 2: Rectifiers, Filters and Power Supply**

Need of rectifier , definition ,Types of rectifier – Half wave rectifier, Full wave rectifier,(Bridge & centre tapped ) Circuit operation Input/output waveforms for voltage & current, Average (dc) value of current & voltage ( no derivation), Ripple , ripple factor , ripple frequency , PIV of diode used , efficiency of rectifier.(no derivation only definition), Comparison of three types of rectifier, Need of filters, Types of filters- A] shunt capacitor, B] Series inductor, C] LC filter , D] - filter --- only circuit operation (no mathematical derivation),limitations & advantages 2.5 Voltage regulator- Simple voltage regulator circuit using zener, familiarisation with IC regulator circuit (like 78XX , 79XX series etc.), IC 723 adjustable power supply, concept of Switch mode power supply (SMPS) block diagram only.

**Unit-3: Transistors, Switching and Optoelectronics Devices**

Bipolar Junction Transistor (BJT): Symbol of NPN & PNP types, Construction, Different types of package, Operation of NPN and PNP transistor – current flow, relation between different currents ,Transistor configurations – CB, CE, CC circuit diagram for input & output characteristics of each configuration, Input & output characteristics, Comparison between three configuration, Transistor parameters – input & output resistance and relation between them. Transistor specification – VCE Sat, IC Max, VCEO, ICEO, VCE Breakdown, Power dissipation. Field effect Transistor (FET): Symbol, Construction of JFET, Working principle and V-I characteristics of JFET, pinch- off voltage, drain resistance, trans conductance, amplification factor and their relationship, Enhancement and depletion type MOSFET. TRIAC, DIAC, Silicon control rectifier (SCR):-Symbol, working, application (elementary ideas only) Comparison

between Transistor and SCR. Elementary ideas of LED, LCD, photodiode, phototransistor and solar cell and their applications only.

#### **Unit- 4: Transistor Biasing**

Need of biasing, concept of DC load line and AC load line, selection of Q point and Stabilization, Types of biasing circuits (no mathematical derivation) – a) Fixed biased circuit, b) Collector-to-base biased circuit, c) Voltage divider bias circuit

#### **Unit – 5: Small Signal Transistor Amplifiers**

Concept of amplification----Small signal amplifier using BJT, Determination of current, voltage & power gain, Input & output resistance. Single stage CE amplifier with voltage divider bias. Its explanation. Frequency response of single stage CE Amplifier, Bel and Decibel unit. Bandwidth & its significance. Cascade Amplifiers (Multistage Amplifier), Need of Multistage Amplifiers, Gain of amplifier. Types of amplifier coupling – RC, transformer & direct coupling. Two stage amplifier circuit diagram, working (briefly), frequency response, merits & demerits & applications of each.

#### **Unit- 6: Oscillator**

Oscillator – Requirement of oscillator circuit, Barkhausen's criteria of oscillator, circuit diagram and its application only -.Phase shift oscillator, Hartley oscillator, Colpitts oscillator, Crystal oscillator

#### **Unit – 7: Op-Amp**

OP-Amp Block diagram and use of op amp as - Inverting, non inverting, summing amplifier, differentiator, integrator, buffer, comparator, Schmitt's trigger.