VIDYASAGAR UNIVERSITY

Midnapore, West Bengal

PROPOSED CURRICULUM&SYLLABUS (DRAFT) OF

BACHELOR OF SCIENCE (HONOURS)

MAJOR IN AUTOMOBILE MAINTENANCE

4-YEAR UNDERGRADUATE PROGRAMME

(w.e.f. Academic Year 2023-2024)

Based on

Curriculum & Credit Framework for Undergraduate Programmes

(CCFUP), 2023& NEP, 2020

VIDYASAGAR UNIVERSITY
BACHELOR OF SCIENCE (HONOURS) MAJOR IN AUTOMOBILE MAINTENANCE
(under CCFUP, 2023)

Level	YR.	SEM	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
								CA	ESE	TOTAL
B.Sc. (Hons.)	3rd	V	SEMESTER-V							
			Major-8	AUTHMJ08	T: Manufacturing process and machine tools- 2; P: Practical	4	3-0-1	15	60	75
			Major-9	AUTHMJ09	T: Engine Servicing, Tuning, Garage & Service Station; P: Practical	4	3-0-1	15	60	75
			Major-10	AUTHMJ10	P: Engineering Drawing;	4	3-1-0	15	60	75
			Major Elective-01	AUTHDSE1	T: Alternate Fuels and Energy Systems; P: Practical	4	3-0-1	15	60	75
			Minor-5 (Disc.-I)	MIN05	*To be decided (To be taken from other Discipline)*	4	3-1-0 / 3-0-1	15	60	75
			Semester-V Total			20				375
		VI	SEMESTER-VI							
			Major-11	AUTHMJ11	T: Estimating, Costing and Machine Design;	4	3-1-0	15	60	75
			Major-12	AUTHMJ12	T: Air Conditioning & Refrigeration System; P: Practical	4	3-0-1	15	60	75
			Major-13	AUTHMJ13	T: Vehicle Performance and Testing; P: Practical	4	3-0-1	15	60	75
			Major Elective-02	AUTHDSE2	T: Motor Vehicle Act & Pollution Control; P: Practical	4	3-0-1	15	60	75
			Minor-6 (Disc.-II)	MIN06	*To be decided (To be taken from other Discipline)*	4	3-0-1	15	60	75
			Semester-VI Total			20				375
			YEAR-3			40				750
			Eligible to be awarded Bachelor of Science in Automobile Maintenance *on Exit*			126	Marks (Year: I+II+III)			2325

MJ = Major, MI = Minor Course, DSE = Discipline Specific Elective Course, CA= Continuous Assessment, ESE= End Semester Examination,
T = Theory, P= Practical, L-T-P = Lecture-Tutorial-Practical

SEMESTER-V

MAJOR (MJ)

MJ-8: Manufacturing process and machine tools- 2 **Credits 04 (Full Marks: 75)**

MJ-8T: Manufacturing process and machine tools- 2 (Theory) **Credits 03**

Course contents:

Unit-I:
Concept of moulding materials, concept of moulding sand, properties of moulding sand, types moulding sand binder, moulding sand additives, gate and riser, types of moulding sand, core making, core binder.

Unit-II:
Casting process, Permanent mould casting, semi-permanent mould casting, die casting, centrifugal casting, investment casting, continuous casting, defect in casting, inspection of casting, cleaning of casting.

Unit-III:
Definition and concept of smithy and forging, sheet metal work, rivets and screws.

Unit-IV:
Machine Shops: - Elementary ideas about the different machines like Slotting machine, planning machine, boring machine, broaching machine, press machine.

Unit- V:
Elementary ideas about different non-traditional machine like Ultrasonic machining (USM), Electro chemical machining (ECM), Electrical discharge machining (EDM), Laser beam machining (LBM), Application and working principle of non-traditional machine.

Unit-VI:
Definition and concept of N.C Machine tools and C.N.C Machine tools, Classification of N.C and C.N.C Machine, Application and working principle of these machine.

MJ-8P: Manufacturing process and machine tools- 2 (Practical) **Credits 01**

Course Outline:

1. Preparations of Moulding Sand, green sand, Dry Sand, Loam Sand.
2. Preparations of mould cavity.
3. Sheet metal work to be Performed for the given job
4. Produce jobs by using slotting machine, Keyway slotting.
5. Smith and forging operation to be performed for the given job:- Upsetting, Drawing Down, Punching, Bending, etc.

MJ-9: Engine Servicing, Tuning, Garage & Service Station **Credits 04 (FM: 75)**

MJ-9T: Engine Servicing, Tuning, Garage & Service Station (Theory) **Credits 03**

Course contents:

Unit-I:
Engine servicing and tuning: Basic requirements of automobiles engine servicing types and procedures. Garage and service station: Location and layout, equipment required in a service station, types of service.

Unit-II:
Servicing of Motor vehicles: Signification of servicing and its types, engine tuning and various instruments used, decarbonising of engine parts, servicing of batteries, Electrical systems, servicing of fuel injection and ignition system, lubrication system, cooling system, braking system and other accessories.

Unit-III:
Concept of Fuel saving: How to save Fuel, Technical Tips for Save Fuel by Ignition system, Adjustments Needed to reduce the consumption of Fuel in Cars, How to get more mileage of an motor vehicles.

Unit-IV:
Reconditioning Equipment: Degreasing process for vehicle parts on the plant, De- Carbonising process of parts, Engine cylinder removal process of cylinder, cylinder reboring process, cylinder honing process, Valve seat grinding process, crankshaft grinding process, fuel injector tester machine, FIP pump phasing and calibration testing process.

Unit-V:
General maintenance schedule of service station: vehicle check in Daily maintenance, weekly maintenance, monthly maintenance, general and periodic check up every 6000 kms, 9000 kms, 12000kms

MJ-9P: Engine Servicing, Tuning, Garage & Service Station (Practical) **Credits 01**

Course Outline:

1. Layout of typical garage and service station: Draw and mention of the layout proper garage and service station, modern service station layout

2. Major Equipment for service station: operation and service car washing machine, vehicle host, air compressor, high pressure lubrication equipment.

3. Servicing: After the first service 500 to 750 km, 2500 to 2800 km, 5000 to 5500 km, 7000 to 7500 km vehicle parts clean check and replace, servicing of air cleaner, air inlet and exhaust manifold, fuel system, lubrication system, cooling system, transmission system, ignition system, brake system, steering system.

MJ-10: Engineering Drawing **Credits 04(Full Marks: 75)**

MJ-10T: Engineering Drawing (Theory) **Credits 04**

Course contents:

Unit-I Geometrical construction:

1. Angle: Measurement and its types, method of bisecting
2. Triangle: Different types of triangle
3. Rectangular, Rhombus, square, parallelogram,
4. Circle, Different types of polygon, oval.

Unit-II: Scale: Plain Scale, Diagonal scale. Vanier Scale.

Unit-III: Projection: Straight line, lamina, orthographic.

Unit-IV: Concept of ISO metric view, Isometric projection, and Surface Development.

Unit-V: Joint: Rivet Joint, Nuts & Bolts, Cotter Joint, and Knuckle Joint.

Unit-VI: Coupling: Flange Coupling, Universal Coupling.

Unit-VII: Gears: Involutes teeth, Cycloid teeth.

Unit-VII: Pulleys: Step pulley, Cone Pulley.

MAJOR ELECTIVE (DSE)

Major Elective -1: Alternate Fuels and Energy Systems **Credits 04(Full Marks: 75)**

MJ DSE-1T: Alternate Fuels and Energy Systems (Theory) **Credits 03**

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, Etherification, 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

Unit-IV: Methane gas:
Concept of Methane gas, water gas, Producer gas, their preparation procedure process, properties, calorific value and their etherification, performance and emission characteristics.

MJ DSE-1P: Practical **Credits 01**

Course Outline:

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.

MINOR (MI)

TO BE DECIDED
(SELECTED FROM OTHER DECIPLINES)

SEMESTER-VI

MAJOR (MJ)

MJ-11: Estimating, Costing and Machine Design **Credits 04 (Full Marks: 75)**

MJ-11T: Estimating, Costing and Machine Design (Theory) **Credits 03**

Course contents:

Unit-I: Estimating and Costing
Definition of estimating and costing, elements of costing, Determination of costs of various parts such as block, cylinder, nuts, bolts, rivets, Estimate of machining price of several parts, Solution of Mathematical Problems.

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, cotter joint, nuts & bolts, shaft. Pulley.

MJ-11P: : Estimating, Costing and Machine Design (Practical) **Credits 01**

Course Outline:

MJ-12: Air Conditioning & Refrigeration System Credits 04 (Full Marks: 75)

MJ-12T: Air Conditioning & Refrigeration System (Theory) Credits 03

Course contents:

Unit-I: Application of Refrigeration and Air conditioning:
Introduction, Domestic Refrigerator, Defrosting in refrigerators, controls in refrigerator, Room Air conditioner, Water cooler, Refrigerated trucks, lee manufacture, cold storages

Unit-II: Refrigerants:
Introduction, Classification of refrigerants, Designation system for Refrigerants, comparison of Refrigerants, Thermodynamic chemical and physical properties of refrigerants.

Unit-III: Air refrigeration cycles and system:
Introduction, Unit of refrigeration, co efficient of performance of a refrigerator, Difference between a heat pump, Heat engine and refrigerator, Air refrigerator working on reversed car not cycle and bell-Coleman cycle. Merits and demerits of air refrigeration system.

Unit-IV: Simple vapour compression refrigeration system:
Introduction, Advantages and Disadvantages of vapour compression refrigeration system over Air refrigeration system, pressure enthalpy (p-h) chart, simple saturation cycle with sub- cooling of liquid refrigerant by vapour refrigerant, simple saturation cycle with sub-cooling of liquid refrigerant by liquid refrigerant

Unit-V: Components of Refrigerating system:
Introduction, compressor, classification of compressor, advantages and disadvantages of each types of compressor. Condensers, classification of condenser, Evaporators, working of an evaporator, capacity of an evaporator, expansion devices, classification of expansion device, capillary tube.

Unit-VI: Psychometric:
Introduction, Psychometric terms, Psychometric relations, psychometric chart and process, sensible heating and cooling, efficiency of heating and cooling coils

Unit-VII: Air-condition systems:
Introduction, factor effecting comfort air conditioning, Air-conditioning system, classification of Air-conditioning system, comfort air condition system, Industrial Air condition system, Winter air condition system, summer Air condition system, central Air condition system, room sensible heat factor, effective room sensible heat factor.

MJ-12P: Air Conditioning & Refrigeration System (Practical) **Credits 01**

Course Outline:

1. Identify Air conditioning components, Performance test on A/c unit,
2. Inspecting & adjusting an engine drive belt, Replacing an engine drive belt.
3. Check heating system, Compressor rotation test, air Gap check,
4. Replenishing compressor oil level. Troubles diagnose and remedy for No cooling or warm air, Cool air comes out only intermittently, Insufficient cooling,
5. Check abnormal noise from compressor, Magnetic clutch, condenser, evaporator, Blower motor.
6. test for High pressure gauge –pressure high and low, Low pressure gauge for pressure high and low.

MJ-13: Vehicle Performance and Testing Credits 04 (Full Marks: 75)

MJ-13T: Vehicle Performance and Testing (Theory) Credits 03

Course contents:

Unit-I: Vehicle Performance Parameters:
Introduction, Work, Energy, power, Torque, Bore and Stroke, piston Displacement, Engines Displacement, Compression Ratio

Unit-II: Volumetric Efficiency
Volumetric Efficiency, Engine Performance Parameter, Testing of constant Speed I.C Engines, Measurement of Air Supply to I.C Engine, Efficiency of Engines (Mechanical Efficiency, Indicated thermal Efficiency, Brake thermal Efficiency, Relative Efficiency),

Mean Effective Pressure, Morse Test and Mathematical Problems, Heat Balance Sheet for I.C Engines, Performance and Tasting of I.C Engines.

Unit-III: Vehicle Testing
Introduction, Definition of Testing and Inspection and its types, Laboratory and Road Testing's of an Automobile, Inspection card, Repair Inspection, Accident Inspection, Excessive consumption fuel and lubricating oil, Diagnosing Engine Faults and their Removal.

Unit-IV:
Standard Operating Condition for an Automobile Engine, Recommended Engine Log Sheet for I.S Specifications for Performance Test of constant speed internal combustion Engines for General Purposes,

Unit-IV: Noise Vibration
Noise & vibration: Mechanism of noise generation, engine noise & vibration, causes and remedies, road shocks wind noise & measurement, vehicle measurement testing. Instrumentation for functional tests, Battery testing, endurance test.

MJ-13P: Vehicle Performance and Testing (Practical) Credits 01

Course Outline:

1. Disassemble the engine component: Overhauling cylinder head, rocker arm, piston, connecting rod, crankshaft pulley, timing gears-chain, fly wheel, crank shaft, of multi-cylinder engine. Injector testing with bench tester Fresing and calibration of diesel engine
2. Construction and working principle of EGR and catalytic convertor.
3. Testing procedure of suspension, brake and steering system.
4. Exhaust emission testing, oil consumption testing and road test.

MAJOR ELECTIVE (DSE)

Major Elective -2: Motor Vehicle Act & Pollution Control Credits 04(Full Marks: 75)

MJ DSE-2T: Motor Vehicle Act & Pollution Control (Theory) Credits 03

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 sings, Accident claims, Accident claims tribunals.

Unit II: Pollution:
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, NOx 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, Nox 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

MJ DSE-2P: Motor Vehicle Act & Pollution Control (Practical) Credits 01

1. Identification of Information, 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.