VIDYASAGAR UNIVERSITY

Midnapore, West Bengal

PROPOSED CURRICULUM&SYLLABUS (DRAFT) OF

B.Sc. (HONOURS / HONOURS WITH RESEARCH)

MAJOR IN AUTOMOBILE MAINTENANCE

DRAFT

4-YEAR UNDERGRADUATE PROGRAMME

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

Based on

Curriculum & Credit Framework for Undergraduate Programmes

(CCFUP), 2023& NEP, 2020

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VIDYASAGAR UNIVERSITY
B.SC. (HONOURS/ HONOURS WITH RESEARCH) 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./ Hons. with Research)	4th	VII	SEMESTER-VII								
			Major-14	AUTHMJ14	T: Elementary Fluid Mechanics		4	3-1-0	15	60	75
			Major-15	AUTHMJ15	T: Electrical System; P: Practical		4	3-0-1	15	60	75
			CRM	AUTHCRM	P: Operations Research and Ethics		4	3-1-0	15	60	75
			Major Elective-03	AUTHDSE 03	T: Two and Three Wheelers; P: Practical		4	3-0-1	15	60	75
			Minor-07 (Disc.-I)	MIN07	To be decided *(To be taken from other Discipline)*		4	3-1-0/ 3-0-1	15	60	75
						Semester-VII Total	20				375
		VIII	SEMESTER-VIII								
			Major-16	AUTHMJ16	T: Hybrid and Electric Vehicles; P: Practical		4	3-0-1	15	60	75
			Major Elective-04	AUTHDSE04	T: Urban Transportation Requirement and Planning; P: Practical		4	3-0-1	15	60	75
			Major Elective-05	AUTHDSE05	P: Driving license and Traffic signal practice on roads	FOR HONOURS STUDENTS	4	0-0-4	15	60	75
			Major Elective-06	AUTHDSE06	P: Industrial Training		4	0-0-4	15	60	75
			Research	AUTHRD	DISSERTATION:	*FOR HONOURS WITH RESEARCH STUDENTS*	*8*	*0-0-8*	*-*	*150*	*150*
			Minor-8 (Disc.-II)	MIN08	To be decided *(To be taken from other Discipline)*		4	3-1-0/ 3-0-1	15	60	75
						Semester-VIII Total	20				375
						YEAR-4	40				750
			To be awarded *B.Sc. (Honours) Major in Automobile Maintenance*				166	Marks (Year: I+II+III+IV)			3075

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

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SEMESTER-VII

MAJOR (MJ)

Major – 14
Elementary Fluid Mechanics
[THEORY; CREDITS: 04; FM- 75; 60L]

Course contents:

Unit-I: Introduction
Concept of Liquid and their properties, Density of water, specific Weight of water, specific gravity of water, compressibility of water, surface tension of water, capillarity of water, fundamental unit.

Unit-II: Fluid pressure and its measurement.
Introduction, pressure head, Pascal's law, Atmospheric pressure, gage pressure, Absolute pressure, measurement of fluid pressure, Monometer, simple monometer, Differential monometer, Mechanical Gauges, Bourdons tube pressure gauge.

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Unit –III: Hydrostatics
Introduction, total pressure, total pressure on an immersed surface, Total pressure on an Inclined immersed surface, Centre pressure of an inclined and vertical surface.

Unit-IV: Hydro Kinematics
Introduction, rate of discharge, motion of fluid particles, types of flow lines, Path lines, Uniform flow, Non uniform flow, steady flow, One-dimension flow, Two Dimension flow, Three-dimension flow.

Unit-V: Bernoulli's Equation and its applications
Introduction , Energy of a liquid in motion , potential energy of a liquid in motion, Kinetic energy of a liquid practice in motion , Bernoulli's Equation

Unit-VI: Flow through orifices and mouthpieces.
Introduction, types of orifices, jet of water , co-efficient of velocity, co-efficient of discharge, loss of head of a liquid flowing in a pipe, Discharge through a mouth piece(internal & external)

Unit-VII: Flow through pipes
Introduction, Loss of head in pipes, Total energy line transmission of power through pipe, Discharge from one reservoir to another through a pipe line , Discharge through a compound pipe(Series & parallel) , Velocity of water through a Nozzle.

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Unit-VIII: Hydraulic Pumps.

Introduction, Types of pump, Types of casing for the impeller of a Centrifugal pump, Work done by a centrifugal pump, Monometric head, Mechanical efficiency ,overall efficiency, Discharge of a centrifugal pump, Power require to drive centrifugal pump.

Reciprocating pump, Classification of reciprocating pump, Discharge of a Reciprocating pump ,slip and negative slip of a reciprocating pump, Power require of a reciprocating pump.

Unit- IX: hydraulic Turbines.

Introduction, Classification of Turbines, work done by an Impulse turbine, Power produce by an Impulse turbine, Efficiency of an Impulse turbine, Mechanical and overall efficiency of an Impulse turbine.

Reaction Turbine, Components of Reaction Turbine, power produce by a Reaction turbine, Mechanical and overall efficiency of reaction turbine.

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Major – 15
Electrical System
[Credits: 3T FM – 40 (45L) + 1P FM-20 (30L)]

Theory (3 Credit, 45 hrs.)

Course contents:

Unit-I : Generator, Alternator, Starting Motor and Batteries.
Concept of Various electrical Instruments in an automobile, Automobile batteries and its maintenance and function of generator, alternator, 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 Wring system, Lamp/light bulb information, Headlights-description of standard sealed beam, halogen sealed beam, composite and High intensity discharge (HID) headlights. Park & tail light circuits, Brake light circuits, turn signal circuit, Cornering lights, Fog lights circuit, interior lights- courtesy, reading and instrument panel lights, Smart lighting , Reverse lights wring diagram, colour coding with diagram.

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Unit-III: Accessories and control
Horn and its type, wind screens, wiper, power window components and circuit,direction indicators and flashing units, signalling system, Power door lock circuit, automatic door lock circuit, remote keyless entry system circuit, antitheft system, immobilizer system. Navigation system, lamps and their types, starter switch, Speedo meter , Antitheft devices, Description and function of Airbags, Seatbelt, Vehicle safety systems, fuel gauge, Tire pressure monitoring systems Integrated communications, oil pressure gauge, Temperature gauge.

Unit-IV :
Concept of battery , classification of batteries , function of battery, charging procedure of batteries, testing of battery, inspection and maintenance of battery, impotent role of a battery use in automobile.

Practical (1 Credit, 30 hrs.)

Electrical system: Testing of battery, Connecting of battery both series and parallel, Colour code of wiring circuit, Circuit connection of horn, indicator, Head light, Ignition connection, Checking of tail light, Fog light, Checking of dash board.

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Electrical Instruments: Disassembly and Assembly of Dynamo, Disassembly and Assembly of Alternator, Disassembly and Assembly of Starting Motor, Disassembly and Assembly of power Windows, Disassembly and assembly of Wiper Motor,

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COMPULSORY RESEARCH METHODOLOGY (CRM)

[for both Hons. and Hons. with Research students]

Operations Research and Ethics

Credit: 4; Full Marks: 75

Course Content:

UNIT-I: Operations Research:

Introduction to OR, definition, linear programming; graphical method, simplex method, dual problem, dual simplex method, transportation and assignment problems

UNIT-II: Project Management:

CPM and PERT, Queuing theory, Game theory, Markov chain, basics of Monte Carlo Simulation.

UNIT-III: Engineering Ethics:

Science, Technology and Engineering as knowledge and as social and professional activities.
Inter-relationship of technology growth and social, economic and cultural growth; historical perspective.
Ancient, medieval and modern technology/industrial revolution and its impact; the Indian Science and Technology.
Environmental degradation and pollution; eco-friendly technologies; environmental regulations; environmental ethics.

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MAJOR ELECTIVE (DSE)

Major Elective – 03:
Two and Three Wheelers
[Credits: 3T FM – 40 (45L) + 1P FM-20 (30L)]

Theory (3 Credits, 45 hrs):

Unit-I: Power system:
Two stroke SI engine, four stroke SI engine; merits and demerits, Symmetrical and unsymmetrical port timing diagrams, Types of scavenging processes, merits and demerits, scavenging pumps, Rotary valve engine; Fuel system, Lubrication system. Magneto coil and battery coil spark ignition system, electronic ignition system; Starting system, Kick starter system.

Unit-II: Chassis Systems:
Mainframe and its types. Chassis and shaft drive, Single, multiple plates and centrifugal clutches. Gear box and gear controls. Front and rear suspension systems; Shock absorbers; Panel meters and controls on handle bar.

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Unit-III: Brakes, Wheels and Tyres
Drum brakes, disc brakes, front and rear brake links, layouts, Spooked wheel, cast wheel, disc Wheel, disc types; Tyres and tubes.

Unit-IV: Case studies:
Two Wheelers: Case study of major Indian models of motorcycles, scooters and mopeds, TVS mopeds and motorcycles, Hero Honda motorcycles, Bajaj scooters and motorcycles, Yamaha, Enfield motorcycles; Servicing and maintenance.
Three Wheelers: Case study of Indian models, Auto rickshaws, pickup van, delivery van and trailer, Maintenance: daily, weekly, monthly, Fault tracing.

Practical (1 Credit):

1. Construction and operation of 4stroke SI engine.
2. Construction and operation of 2stroke petrol.
3. Fuel supply circuit of 2 wheeler and 3 wheeler.
4. Operation of lubricating system.
5. Operation of Magneto coil and Magneto coil ignition.
6. Operation electronic ignition.
7. Starting system and operation.
8. Construction and working of clutching system.

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9. Construction and operation of Transmission Gear box.
10. Construction and operation of suspension system.
11. Construction and operation of Braking system.
12. Fitment and operation of wheels, tyre and tube.

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MINOR (MI)

Minor-07

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SEMESTER-VIII

MAJOR (MJ)

Major – 16
Hybrid and Electric Vehicles

[Credits: 3T FM – 40 (45L) + 1P FM-20 (30L)]

Theory (3 Credit, 45 hrs.)

Course contents:

Unit-I: HYBRID VEHICLES
Concepts of hybrid electric drive train, types, architecture of series and parallel hybrid electric drive train, merits and demerits, design of series and parallel hybrid electric drive train

Unit-II: ELECTRIC VEHICLES
Layout of an electric vehicle, performance of electric vehicles – traction motor characteristics, tractive effort, transmission requirements, vehicle performance, energy consumption, advantage and limitations, specifications, system components, electronic control system.

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Unit-III: ELECTRIC PROPULSION SYSTEMS AND GENERATORS
DC motors, AC motors, permanent magnet motors, brushless DC and reluctance motors, characteristics, regenerative braking. DC generators, AC generators, voltage and frequency regulations

Unit-IV: CONTROL SYSTEMS AND ENERGY STORAGES
Control system principles, speed and torque control. Electromechanical batteries- types of batteries – lead acid batteries, nickel-based batteries, lithium-based batteries, electrochemical reactions, thermodynamic voltage, specific energy, specific power, energy efficiency, ultra-capacitors.

Unit-V: FUEL CELLS & SOLAR CARS
Fuel cell, construction, working, equations, possible fuel sources, fuel reformer, design. Solar cars photovoltaic cells, tracking, efficiency and cost comparison.

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Practical (1 Credit, 30 hrs.)

Unit-I:

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 senor, potentiometer, magnetic induction sensor, cam shaft sensor, crankshaft position sensor.

Unit-II:

Diagnose automatic seat belt systems, Diagnose air bag system and service warnings.
Familiarization of car radio wiring and speaker circuits.
Diagnose for remote keyless entry and immobilizer system.
Diagnose the power door lock control for – All power door locks do not operate, only one power door lock not operate.
Diagnose the power window system for – all power window motors do not operate, some switches do not operate.

Unit-III:

Diagnose causes for improper operation of the windshield washer system and to replace the pump if faulty.
Perform Trouble shooting and remedy for windshield wiper and washer - no operation, intermittent operation, continuous operation, and wipers will not park.
Remove and install wiper motors and wiper switches. Checking & replacing wiper blade
Perform Trouble shooting and remedy for Horn- No horn operation, poor sound quality, horn sounds continuously and to replace the horn if faulty.

Unit-IV:

Tyre pressure warning, advance front moving head light with road direction, Neon technology light, head light leveling (up & down) and beam setting fog light

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MAJOR ELECTIVE (DSE)

Major Elective – 04
Urban Transportation Requirement and Planning
[Credits: 3T FM – 40 (45L) + 1P FM-20 (30L)]

Theory (3 Credit, 45 hrs.)

Unit I: Urban Transportation System Planning

1. Role of transportation in urban development
2. Transportation problems in urban areas
3. Purpose of transportation planning
4. Transportation planning process and factors affecting it
5. Travel demand and actors affecting it
6. Urban transport forecasting

Unit II: Transportation Surveys

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

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Unit III: Trip Generation and Distribution

1. Trip generation: Trip purpose, Problems of trip generation
2. Factors governing trip generation and attraction rates
3. Trip distribution
4. Methods of trip distribution: Uniform factor, Average factor, Detroit, Fratar, Furness and
5. Time factor method
6. Problems based on trip distribution

Unit 4: Transportation Plan Preparation

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

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Practical (1 Credit, 30 hrs.)

1. Prepare write up on transportation planning process.
2. Model project on Urban mass rapid transit system.

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MAJOR ELECTIVE- 05

[to be studied by Honours students only]

Driving license and Traffic signal practice on roads

[CREDITS: 04; FM- 75; 60L]

[Project / Practical]

Course Outline:

1. Practice in straight driving on wide roads.
2. Driving through lanes and curves.
3. Practice in reversing, Practice overtaking another vehicle.
4. Practice in driving through sand and wet surfaces.
5. Practice in parking and Diagonal parking.

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MAJOR ELECTIVE- 06

[to be studied by Honours students only]

Industrial Training

Credit: 4; Full Marks: 75

[Project / Practical]

Course Outline:

1. Industrial Training (4Week)

a) Paper presentation of field report
b) Submission and presentation (PPT) of field report

2. Model presentation

a) Project type model experiment
b) Paper presentation of model

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PROJECT / DISSERTATION (RD)

[to be undertaken by students opting for and eligible for Hons. with Research]

DISSERTATION:
Credit: 8;
Full Marks: 150

General Guideline:

1. Identifying problem areas like breach of traffic rules, accidents prone areas, unauthorized parking, delay at intersection etc. at an urban traffic region in the nearby locality.
2. Make a research / dissertation report and presentation on the findings with conclusion.

Structure of the dissertation

Preliminary Pages

- Title Page: Includes name of the student, university, degree, and submission date.
- Certificate/Declaration: Signed statement of originality and supervisor's approval
- Abstract: A 250-350 word summary covering research problem, methodology, and core findings.
- Acknowledgements: To supervisors and others, if any.
- Table of Contents: Clear hierarchical mapping of chapters with page number
- List of Abbreviations: Specialized terms, if any

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Introduction

- Background & Context: Situates the topic in historical or theoretical context.
- Research Problem & Objectives: The specific question or gap the research is addressing.
- Thesis Statement/Hypothesis: The core argument the dissertation intends to prove.
- Scope and Significance: Why the study matters.
- Literature Review & Theoretical Framework

Literature Review: Analyzes existing scholarly works to show the gap the study fills.

- Theoretical Framework: Identifies the philosophers, critics, or schools of thought shaping the analysis in the dissertation.

Methodology

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- Describes *how* the research was conducted - Anyone or a combination of textual analysis/ archival research/ conducting interviews/ ethnographic/semi-ethno-graphic research involving both textual analysis and field visit etc.
- Thematic or Analytical Chapters

The Core Body: Usually 3 to 4 chapters focusing on the core concerns of the study.

- Structure: Each chapter introduces its specific theme, analyzes primary and secondary sources, and contributes to the overarching thesis.

Conclusion

- Summary & Synthesis: Recaps your main points without simply repeating them.

Final Verdict: Answers the research questions posed in the introduction.

Future Scope: Suggests how future scholars can build upon your work.

- Works Cited/ Reference, and/or Bibliography: A comprehensive list of all primary and secondary sources cited as per the latest MLA style.

Appendices: Transcripts, interview logs, or raw archival data, if any.

Marks distribution-

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Sl. No	Particulars	Marks
1	Research Project / Dissertation Report	70
	▪ Proposal and Abstract (along with some keywords)	10
	▪ Literature Review &Theoretical Framework	10
	▪ Methodology and Research design	10
	▪ Thematic Analysis (Chapter-wise)	20
	▪ Report Quality	20
2	Seminar Presentation	30
3	Viva-Voce	50
Total		**150**

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MINOR (MI)

Minor-08

TO BE DECIDED

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