

ANNA UNIVERSITY, CHENNAI
NON- AUTONOMOUS COLLEGES AFFILIATED TO ANNA UNIVERSITY
M.E. AUTOMOBILE ENGINEERING
REGULATIONS 2021
CHOICE BASED CREDIT SYSTEM
I TO IV SEMESTERS CURRICULA AND I SEMESTER SYLLABI
SEMESTER I

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	MA4154	Advanced Numerical Methods	FC	4	0	0	4	4
2.	AM4101	Automotive Chassis and Drive Line Systems	PCC	3	1	0	4	4
3.	AM4102	Engine and Auxiliary Systems	PCC	3	0	0	3	3
4.	AM4103	Automotive Electrical and Electronics	PCC	3	0	0	3	3
5.	RM4151	Research Methodology and IPR	RMC	2	0	0	2	2
6.		Professional Elective – I	PEC	3	0	0	3	3
7.		Audit Course – I*	AC	2	0	0	2	0
PRACTICALS								
8.	AM4111	Engine and Chassis Components Laboratory	PCC	0	0	4	4	2
9.	AM4112	Automotive Electrical and Electronics Laboratory	PCC	0	0	4	4	2
TOTAL				20	1	8	29	23

* Audit Course is optional.

SEMESTER II

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	AM4251	Electric and Hybrid Vehicles	PCC	3	0	0	3	3
2.	AM4201	Automotive Pollution and Control	PCC	3	0	0	3	3
3.	AM4202	Dynamics of Road Vehicles	PCC	3	0	0	3	3
4.	AM4203	Vehicle Body Engineering	PCC	3	0	0	3	3
5.		Professional Elective – II	PEC	3	0	0	3	3
6.		Audit Course – II*	AC	2	0	0	2	0
PRACTICALS								
7.	AM4211	Engine and Vehicle Testing Laboratory	PCC	0	0	4	4	2
8.	AM4212	Design and Modelling of Vehicle Components Laboratory	PCC	0	0	4	4	2
9.	AM4213	Mini Project with Seminar	EEC	0	0	4	4	2
TOTAL				17	0	12	29	21

* Audit Course is optional.

SEMESTER III

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	AM4301	Engine Management Systems	PCC	3	0	0	3	3
2.		Professional Elective – III	PEC	3	0	0	3	3
3.		Professional Elective – IV	PEC	3	0	0	3	3
4.		Open Elective	OEC	3	0	0	3	3
PRACTICAL								
5.	AM4311	Project Work I	EEC	0	0	12	12	6
TOTAL				12	0	12	24	18

SEMESTER IV

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
PRACTICAL								
1.	AM4411	Project Work II	EEC	0	0	24	24	12
TOTAL				0	0	24	24	12

TOTAL CREDITS TO BE EARNED FOR THE AWARD OF THE DEGREE - 74

PROFESSIONAL ELECTIVE COURSES

SEMESTER I, ELECTIVE – I

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	AM4001	Vehicle Design	PEC	3	0	0	3	3
2.	AM4002	Automotive Materials	PEC	3	0	0	3	3
3.	AM4003	Special Purpose Vehicles	PEC	3	0	0	3	3
4.	AM4004	Instrumentation and Experimental Techniques	PEC	3	0	0	3	3
5.	AM4005	Theory of Fuels and Lubricants	PEC	3	0	0	3	3
6.	AM4006	Design and Analysis of Experiments	PEC	3	0	0	3	3

SEMESTER II, ELECTIVE – II

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	AM4007	Finite Element Methods in Automobile Engineering	PEC	3	0	0	3	3
2.	AM4008	Noise, Vibration and Harshness for Automobiles	PEC	3	0	0	3	3
3.	AM4009	Two and Three Wheelers	PEC	3	0	0	3	3
4.	AM4010	Hydrogen and Fuel Cells for Automobiles	PEC	3	0	0	3	3
5.	IC4251	Computational Fluid Dynamics	PEC	3	0	0	3	3
6.	AM4011	Engine Combustion Thermodynamics and Engine Heat Transfer	PEC	3	0	0	3	3

SEMESTER III, ELECTIVE – III

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	AM4012	Alternative Fuels and Propulsion Systems	PEC	3	0	0	3	3
2.	AM4013	Hydraulic and Pneumatic Systems	PEC	3	0	0	3	3
3.	AM4014	IC Engine Process Modelling	PEC	3	0	0	3	3
4.	AM4015	Vehicle Control Systems	PEC	3	0	0	3	3
5.	AM4016	Vehicle Maintenance and Diagnostics	PEC	3	0	0	3	3
6.	AM4017	Intelligent Transport Systems	PEC	3	0	0	3	3

SEMESTER III, ELECTIVE – IV

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	AM4018	Road Vehicle Aerodynamics	PEC	3	0	0	3	3
2.	AM4019	Production of Automotive Components	PEC	3	0	0	3	3
3.	AM4020	Thermal Management of Hybrid Systems	PEC	3	0	0	3	3
4.	AM4021	Vehicle Air Conditioning Systems	PEC	3	0	0	3	3
5.	AM4022	Automotive Safety	PEC	3	0	0	3	3
6.	AM4023	Industry 4.0 and IOT	PEC	3	0	0	3	3

AUDIT COURSES (AC)

Registration for any of these courses is optional to students

SL. NO	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			CREDITS
			L	T	P	
1.	AX4091	English for Research Paper Writing	2	0	0	0
2.	AX4092	Disaster Management	2	0	0	0
3.	AX4093	Constitution of India	2	0	0	0
4.	AX4094	நற்றமிழ் இலக்கியம்	2	0	0	0

PROGRESS THROUGH KNOWLEDGE

COURSE OBJECTIVES :

- To study various numerical techniques to solve linear and non-linear algebraic and transcendental equations.
- To compare ordinary differential equations by finite difference and collocation methods.
- To establish finite difference methods to solve Parabolic and hyperbolic equations.
- To establish finite difference method to solve elliptic partial differential equations.
- To provide basic knowledge in finite elements method in solving partial differential equations.

UNIT I ALGEBRAIC EQUATIONS**12**

Systems of linear equations : Gauss elimination method – Pivoting techniques – Thomas algorithm for tri diagonal system – Jacobi, Gauss Seidel, SOR iteration methods – Conditions for convergence - Systems of nonlinear equations : Fixed point iterations, Newton's method, Eigenvalue problems : Power method and Given's method.

UNIT II ORDINARY DIFFERENTIAL EQUATIONS**12**

Runge - Kutta methods for system of IVPs – Numerical stability of Runge - Kutta method – Adams - Bashforth multistep method, Shooting method, BVP : Finite difference method, Collocation method and orthogonal collocation method.

UNIT III FINITE DIFFERENCE METHOD FOR TIME DEPENDENT PARTIAL DIFFERENTIAL EQUATIONS**12**

Parabolic equations : Explicit and implicit finite difference methods – Weighted average approximation - Dirichlet's and Neumann conditions – Two dimensional parabolic equations – ADI method : First order hyperbolic equations – Method of numerical integration along characteristics – Wave equation : Explicit scheme – Stability.

UNIT IV FINITE DIFFERENCE METHODS FOR ELLIPTIC EQUATIONS**12**

Laplace and Poisson's equations in a rectangular region : Five point finite difference schemes, Leibmann's iterative methods, Dirichlet's and Neumann conditions – Laplace equation in polar coordinates : Finite difference schemes – Approximation of derivatives near a curved boundary while using a square mesh.

UNIT V FINITE ELEMENT METHOD**12**

Basics of finite element method : Weak formulation, Weighted residual method – Shape functions for linear and triangular element – Finite element method for two point boundary value problems, Laplace and Poisson equations.

TOTAL : 60 PERIODS**COURSE OUTCOMES:**

After completing this course, students should demonstrate competency in the following skills:

- Solve an algebraic or transcendental equation, linear system of equations and differential equations using an appropriate numerical method.
- Solving the initial boundary value problems and boundary value problems using finite difference and finite element methods.
- Solving parabolic and hyperbolic partial differential equations by finite difference methods.
- Compute solution of elliptic partial differential equations by finite difference methods.
- Selection of appropriate numerical methods to solve various types of problems in engineering and science in consideration with the minimum number of mathematical operations involved, accuracy requirements and available computational resources.

REFERENCES :

1. Burden, R.L., and Faires, J.D., "Numerical Analysis – Theory and Applications", 9th Edition, Cengage Learning, New Delhi, 2016.
2. Gupta S.K., "Numerical Methods for Engineers", 4th Edition, New Age Publishers, 2019.
3. Jain M. K., Iyengar S. R., Kanchi M. B., Jain, "Computational Methods for Partial Differential Equations", New Age Publishers, 1993.
4. Sastry, S.S., "Introductory Methods of Numerical Analysis", 5th Edition, PHI Learning, 2015.
5. Saumyen Guha and Rajesh Srivastava, "Numerical methods for Engineering and Science", Oxford Higher Education, New Delhi, 2010.
6. Smith, G. D., "Numerical Solutions of Partial Differential Equations: Finite Difference Methods", Clarendon Press, 1985.

AM4101

AUTOMOTIVE CHASSIS AND DRIVE LINE SYSTEMS

L T P C
3 1 0 4

COURSE OBJECTIVES:

- To understand the basic knowledge about various vehicle frames, front axles, steering systems and understand the conditions for true rolling motion of wheels during steering.
- To recognize the construction and working principle of drive line, final drive, differential and suspension systems
- To review the knowledge about the constructional feature of rear axle, wheels, tyres and braking systems.
- To impart knowledge on detailed concept, construction and principle of operation of various types of mechanical transmission components
- To design and select Hydrodynamic Transmission for various applications

UNIT I CLUTCH & GEAR BOX

12

Different types of clutches and requirement of transmission system – Principle, construction, torque capacity and design aspects of friction clutches – Objective of the gear box -Different types of gear boxes-Determination of gear box ratios & design of gear box for different vehicle applications – Typical problems.

UNIT II DRIVE-LINE STUDY, FRONT AXLE & REAR AXLE

12

Propeller shaft, Universal joints, Final drive – Different types, double reduction and twin speed final drives - Rear axle construction – Full floating, three quarter floating and semi-floating arrangements – Differential lock, Non-slip differential, Hotchkiss and torque tube drives – Effect of driving thrust and torque reaction, radius rods – Front axle construction, materials, constant velocity universal joint and front wheel geometry.

UNIT III STEERING, SUSPENSION, WHEELS AND BRAKING SYSTEM

12

Condition of true rolling motion of road wheels during steering- Ackermann and Davis steering – Different type of steering gear boxes and linkages – Hydraulic and Electronic power steering. Factors influencing ride comfort – Independent suspension- Rubber, pneumatic, hydro-elastic suspension, shock absorbers.

Construction of wheels and tyres – Braking torque developed by leading and trailing shoes – Disc brake theory – Factors affecting brake performance – Engine Exhaust Brake – Power brake- Regenerative braking – ABS.

UNIT IV HYDRO-DYNAMIC, HYDRO-STATIC & ELECTRIC DRIVES 12

Fluid coupling and Torque converters: Principle, construction and performance – Reduction of drag torque in fluid coupling – Converter couplings – Multi-stage and poly-phase torque converters – Construction and working principle of typical Janny hydro-static drive – Principle of early and modified Ward Leonard electrical control system – performance characteristics – advantages and limitations.

UNIT V AUTOMATIC TRANSMISSION, OVERDRIVE, HYDRAULIC CONTROL SYSTEMS AND APPLICATIONS 12

Ford-T model gear box – Wilson gear box – Cotal electromagnetic transmission, Chevrolet turboglide transmission – Powerglide transmission – Mercedes Benz automatic transmission – Hydraulic control systems of automatic transmission.

TOTAL= 60 PERIODS

COURSE OUTCOMES:

At the end of this course the student will be able to

- Identify the different types of frame and chassis used in Automotive.
- Relate different types of drive lines, drives and braking systems used in Automotive.
- Acquire knowledge about different types of front axle, rear axles and suspension systems used in motor vehicles.
- Examine the usage of Hydrodynamic devices, hydrostatic devices, automatic transmission system
- Understand Electric drive used in road vehicles automatic transmission system.

REFERENCES

1. Heldt. P. M., Torque converters, Chilton Book Co., 1992
2. Judge. A.W., Modern Transmission systems, Chapman and Hall Ltd., 1990
3. SAE Transactions 900550 & 930910
4. Crouse. W.H., Anglin. D.L, Automotive Transmission and Power Trains construction, McGraw Hill, 1976
5. Birch, Automotive Braking Systems, Thomson Asia, 1999
6. Birch, Automotive Chassis Systems, Thomson Asia, 2000
7. Birch, Automotive Suspension and Steering Systems, Thomson Asia, 1999
8. Newton, Steeds & Garrot, The Motor vehicle, SAE - Butterworths, India, 13th edition, 2001
9. Judge A.W., Mechanism of the car, Chapman and Halls Ltd., London, 1986
10. John Peter Whitehead, Donald Bastow, Car Suspension and Handling, 4th Edition, Allied publishers limited, SAE Department, 2004
11. Automotive Transmissions Authors: Naunheimer, H., Bertsche, B., Ryborz, J., Novak, W. Springer-2011.

COURSE OBJECTIVES:

- To impart knowledge on engine operation and its constructional details
- Understand various subsystems involved in engine operation
- To impart knowledge to design and analyse engine operating parameters like air fuel ratio, injection parameters etc
- Understand the concept of combustion and its effects under various conditions
- To impart knowledge on recent developments on IC engines.

UNIT I ENGINE BASIC THEORY**9**

Introduction - Engine types – Operating cycle - otto, diesel, dual operating cycles – Fuel air cycle and actual cycles – Two and four stroke engines - Engine design and operating parameters - Typical performance and pollution curves for automobile engines.

UNIT II FUEL SUPPLY AND IGNITION SYSTEMS**9**

Objective and theory of carburetion - carburetors, Types, Additional system and modern devices of carburetor — Calculation of air fuel ratio of carburetor - Diesel fuel injection objective and types - pumps and injectors, Introduction to Petrol Injection system - conventional ignition systems, advance mechanisms.

UNIT III AIR MOTION, COMBUSTION AND COMBUSTION CHAMBERS**9**

Combustion stoichiometry- Combustion reactions- chemical equilibrium Combustion in SI and CI engines - Premixed and diffused combustion, laminar and turbulent combustion of fuels in engines. Droplet combustion. Comparison of knock in CI & SI engines. Direct and indirect injection combustion chambers for diesel combustion. Cylinder pressure data and heat release analysis.

UNIT IV ENGINE COOLING, LUBRICATING SYSTEMS AND SUPERCHARGING, TURBOCHARGING**9**

Air cooling and water cooling – thermo syphon cooling, forced cooling systems. Fins and radiator - design calculation. Theory of lubrication — types of lubrication, splash lubrication system, petroil lubrication system, forced feed lubrication system. Properties of engine lubricants. Supercharger and Turbochargers. Modification of an engine for supercharging. Effect of supercharging on engine performance. Variable geometry and variable nozzle turbocharger. E-Turbocharger. Problems.

UNIT V NEW ENGINE TECHNOLOGY**9**

Lean Burn engine – Different approaches to lean burn – LHR engine – Surface ignition Concept – catalytic ignition – homogenous charge compression ignition – variable valve timing – Multi Port Injection System - Gasoline Direct Injection – Common Rail Direct Injection – Recent Trends.

TOTAL : 45 PERIODS**COURSE OUTCOMES:**

- Students will have the basic knowledge on Automotive Engines and its various sub systems along with its functions.
- Student can able to design and solve engine related problems
- Student will have command knowledge over recent development in the area of internal combustion engines.
- Student can apply their knowledge to analyse and correlate the data with recent requirements of automobile industry
- Student to can explore new alternate fuels or energy system to run the automobile

REFERENCES:

1. J.B.Heywood, 'Internal combustion engine Fundamentals', McGraw Hill Book Co, 2017.
2. V.Ganesan, 'Internal combustion Engines', Tata McGraw Hill Book Co, Eighth Reprint, 2012.
3. Edward F.Obert, 'Internal combustion engines and air pollution' Harber and Row Publishers, 1973.
4. M.Khovakh, 'Motor Vehicle Engines', Mir Publishers, Mascow,1976
5. Heinz Helzler " Advanced Engine Technology" E. Arnold, 1995
6. W.H.Crouse and A.L.Anglin, 'Automotive Emission control', McGraw Hill Book Co, 1995.
7. G.S.Springer and A.J.Patterson, 'Engine emissions and pollutant formation', plenum press, New york, 1985.

AM4103

AUTOMOTIVE ELECTRICAL AND ELECTRONICS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To impart knowledge to the students in the principles of operation and constructional details of various Automotive Electrical and Electronic Systems
- To understand the need for starter batteries, starter motor and alternator in the vehicle.
- To differentiate the conventional and modern vehicle architecture and the data transfer among the different electronic control unit using different communication protocols
- To list common types of sensor and actuators used in vehicles.
- To understand dash – Board Instruments, various sensors and networking in vehicles.

UNIT I BATTERY AND STARTING SYSTEMS

9

Types of Batteries – Principle, Construction and Electrochemical action of Lead – Acid battery, Electrolyte, Efficiency, Rating, Charging, Testing and Maintenance. Starting System, Starter Motors – Characteristics, Capacity requirements. Drive Mechanisms. Starter Switches.

UNIT II CHARGING AND LIGHTING SYSTEMS

9

D.C. Generators and Alternators their Characteristics. Control cutout, Electrical, Electromechanical and electronic regulators. Regulations for charging. Wiring Requirements, Insulated and earth return system, details of head light and side light, LED lighting system, head light dazzling and preventive methods. Lighting design.

UNIT III ELECTRONIC IGNITION AND INJECTION SYSTEMS

9

Types of electronic ignition systems - variable ignition timing, distributor less ignition. Spark timing control. TBI, MPFI, GDI Systems. Engine mapping.

UNIT IV ELECTRICAL SYSTEMS

9

Warning and alarm instruments : Brake actuation warning system, traficators, flash system, oil pressure warning system, engine over heat warning system, air pressure warning system, speed warning system, door lock indicators, neutral gear indicator, horn design, permanent magnet horn, air & music horns. Wind shield wiper. window washer, instrument wiring system and electromagnetic interference suppression, wiring circuits for instruments, electronic instruments, dash board illumination.

UNIT V SENSORS, ACTUATORS AND MICROPROCESSOR IN AUTOMOBILES 9

Introduction- Basic Sensor Arrangement- Types of Sensors- Oxygen Sensor- Cranking Sensor- Position Sensor- Engine Oil Pressure Sensor- Linear and Angle Sensor- Flow Sensor- Temperature and Humidity Sensor- Gas Sensor- Speed and Acceleration Sensor- Knock Sensor- Torque Sensor- Yaw Rate Sensors- Tire Pressure Sensor- Actuators & its types-correlation between sensors- actuators-Microprocessor And Microcomputer controlled devices in automobiles such as instrument cluster, Voice warning system, Travel information system, Keyless entry system. Environmental requirements (vibration, Temperature and EMI).

TOTAL : 45 PERIODS**COURSE OUTCOMES:**

At the end of this course the student should be able to

- Define the glossary related to vehicle electrical and electronic system
- Understand the need for starter batteries, starter motor and alternator in the vehicle.
- Differentiate the conventional and modern vehicle architecture and the data transfer among the different electronic control unit using different communication protocols
- List common types of sensor and actuators used in vehicles.
- Understand networking in vehicles.

REFERENCES:

1. Robert Bosch- 'Automotive Hand Book' SAE- 5th Edition- 2018.
2. Judge. A.W., Modern Electrical Equipment of Automobiles, Chapman & Hall, London, 1992.
3. William B. Ribbens -Understanding Automotive Electronics, 5th edition- Butter worth Heinemann, 1998
4. Young. A.P., & Griffiths. L., Automobile Electrical Equipment, English Language Book Society & New Press, 1990.
5. Vinal. G.W., Storage Batteries, John Wiley & Sons inc., New York, 1985.
6. Crouse.W.H., Automobile Electrical Equipment, McGraw Hill Book Co Inc., New York, 1980.
7. Spreadbury.F.G., Electrical Ignition Equipment, Constable & Co Ltd., London, 1962.
8. Robert N Brady Automotive Computers and Digital Instrumentation, Prentice Hall, Eagle Wood Cliffs, New Jersey, 1988.

RM4151**RESEARCH METHODOLOGY AND IPR****L T P C**
2 0 0 2**UNIT I RESEARCH DESIGN 6**

Overview of research process and design, Use of Secondary and exploratory data to answer the research question, Qualitative research, Observation studies, Experiments and Surveys.

UNIT II DATA COLLECTION AND SOURCES 6

Measurements, Measurement Scales, Questionnaires and Instruments, Sampling and methods.

Data - Preparing, Exploring, examining and displaying.

UNIT III DATA ANALYSIS AND REPORTING 6

Overview of Multivariate analysis, Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentation.

UNIT IV INTELLECTUAL PROPERTY RIGHTS 6
Intellectual Property – The concept of IPR, Evolution and development of concept of IPR, IPR development process, Trade secrets, utility Models, IPR & Bio diversity, Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPR Agreement, Trademark, Functions of UNESCO in IPR maintenance.

UNIT V PATENTS 6
Patents – objectives and benefits of patent, Concept, features of patent, Inventive step, Specification, Types of patent application, process E-filing, Examination of patent, Grant of patent, Revocation, Equitable Assignments, Licences, Licensing of related patents, patent agents, Registration of patent agents.

TOTAL :30 PERIODS

REFERENCES

1. Cooper Donald R, Schindler Pamela S and Sharma JK, "Business Research Methods", Tata McGraw Hill Education, 11e (2012).
2. Catherine J. Holland, "Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets", Entrepreneur Press, 2007.
3. David Hunt, Long Nguyen, Matthew Rodgers, "Patent searching: tools & techniques", Wiley, 2007.
4. The Institute of Company Secretaries of India, Statutory body under an Act of parliament, "Professional Programme Intellectual Property Rights, Law and practice", September 2013.

AM4111 ENGINE AND CHASSIS COMPONENTS LABORATORY L T P C
0 0 4 2

COURSE OBJECTIVES:

- To assemble and disassemble the parts of an IC engine.
- To identify the various component of an IC engine.
- To identify the various components in transmission systems of an automobile.
- To assemble and disassemble the various components of transmission system.

LIST OF EXPERIMENTS

1. To assemble and disassemble 1000CC engine
2. To assemble and disassemble six cylinder engine
3. To assemble and disassemble V8 engine
4. To assemble and disassemble CRDI engine
5. To assemble and disassemble MPFI engine
6. To assemble and disassemble Single plate, Diaphragm Clutch.
7. To assemble and disassemble Constant mesh, Sliding mesh gear box
8. To assemble and disassemble Transfer case
9. To assemble and disassemble Differential, Rear axle
10. To assemble and disassemble Front axle.
11. To Study different chassis layouts
12. To Study braking system
13. To Study Steering system
14. To Study Suspension system

TOTAL: 60 PERIODS

COURSE OUTCOMES:

- Dismantle and Assemble the automobile chassis and Engine components
- Identify & differentiate components of SI & CI engines
- Understand working of braking, steering, clutch, transmission, Suspension systems.
- Differentiate various subsystems of two, three & Four wheeler vehicles
- Develop skills in Dismantling and assembling of chassis components.
- Correct minor repairs and trouble shoots the breakdowns.

AM4112 AUTOMOTIVE ELECTRICAL AND ELECTRONICS LABORATORY**L T P C**
0 0 4 2**COURSE OBJECTIVE:**

To import the knowledge in the area of automotive electrical system and electronic system associated in modern vehicles.

LIST OF EXPERIMENTS:

1. Testing of
 - a. battery
 - b. starting systems
 - c. charging systems
 - d. ignition systems
 - e. body controller systems
2. Study of a. automotive lighting system and adjustment of head lights beam
 - a. major electrical components used in modern vehicles
 - b. diagnostic tool used in vehicle
3. Dismantling, testing and assembling of Starter system components
4. Dismantling, testing and assembling of charging system components
5. Basic Analog Experiments like
 - a. Logic gates, Adders, Flip flops
 - b. Amplifier, filter,
 - c. Multiplexer and De-multiplexer
6. Interfacing seven segment displays
7. Microprocessor and microcontroller programming
 - a. Arithmetic and Logic operation,
 - b. Code conversion,
 - c. Waveform generation,
 - d. Look up table
8. Interfacing ADC and DAC for Data Acquisition and Control Application
9. Interfacing Sensors for Measurements of position, displacement, velocity, force, temperature, proximity/range
10. Display, Keyboard, Stepper Motor and DC Motor interface using microcontroller.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to have the knowledge in

- Automotive electrical systems and electrical accessories
- Basic microprocessor / microcontroller programming
- Automotive sensor, transducer, actuator, virtual instrumentation, data acquisition
- Development of embedded systems for automobiles

AM4001**VEHICLE DESIGN**
L T P C
3 0 0 3
COURSE OBJECTIVES:

- To understand the various steps involved in the design of automotive components
- To show their knowledge in designing engine components.
- To complete design exercise and arrive at important dimensions of chassis components.
- To learn the use of standard practices in design.
- To determine the dimensions of front and rear axles

UNIT I DESIGN OF CYLINDER, PISTON AND CONNECTING ROD 10

Choice of material for cylinder and piston, design of cylinder, design of piston, piston pin, piston rings and piston assembly. Material for connecting rod, design of connecting rod assembly. Case study on design of piston for passenger car.

UNIT II DESIGN OF CRANK SHAFT AND VALVES 9

Material for crankshaft, design of crankshaft under bending and twisting. Design aspects of intake & exhaust manifolds, inlet & exhaust valves, valve springs, tappets and valve train. Design of cam & camshaft. Design of rocker arm. Cam profile generation. Case Study on design of camshaft for a four stroke IC engine.

UNIT III DESIGN OF CLUTCHES AND GEARS 10

Design of single plate clutch, multiplate clutch and cone clutch assembly. Torque capacity of clutch. Design of clutch components. Gear train calculations, layout of gearboxes. Calculation of bearing loads and selection of bearings. Design of three speed and four speed gearboxes. Case study on design of gearbox assembly for an ATV.

UNIT IV DESIGN OF VEHICLE FRAME AND SUSPENSION 6

Study of loads-moments and stresses on frame members. Design Of frame for passenger and commercial vehicle - Design of leaf Springs-Coil springs and torsion bar springs. Case study on development of frame for ATV.

UNIT V DESIGN OF FRONT AND REAR AXLE 10

Design of propeller shaft. Design details of final drive gearing. Design details of full floating, semi- floating and three quarter floating rear shafts and rear axle housings. Case study Analysis of loads-moments and stresses at different sections of front axle. Determination of optimum dimensions and proportions for steering linkages, Design of front axle beam.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

The students will be able to

- Analyse the stress and strain imparted on automotive components
- Compute the design and find the dimension of the vehicle components.
- Identify optimal design solutions to real-world problems in compliance with industry standards.
- Demonstrate the design skill by creating new design strategy with the application of the knowledge.
- Interpret the modern system in vehicle and would help in developing the system with less impact to the environment.

REFERENCES:

1. Khurmi. R.S. & Gupta. J.K., "A text book of Machine Design", Eurasia Publishing House (Pvt) Ltd, 2001.
2. Kolchin-Demidov, "Design of Automotive Engines"-Mir Publishers (1984)
3. Stokes, "Manual gearbox design", Butterworth-Heinemann 1992
4. "Design Data Hand Book", PSG College of Technology, 2013- Coimbatore.
5. Dean Avern, "Automobile Chassis Design", Illife Book Co., 2001.
6. Giancarlo Genta, Lorenzo Morello, "The Automotive Chassis Volume 1, Components Design", Springer International Edition.2014
7. Lukin P G G and Rodionov V, "Automobile Chassis Design and Calculations", Mir Publishers, Moscow, 1989.
8. Robert C. Juvinall and Kurt M. Marshek, "Fundamentals of Machine component Design", 6th Edition, Wiley, 2017

AM4002

AUTOMOTIVE MATERIALS

L T P C
3 0 0 3

COURSE OBJECTIVES

The course should enable the students to:

- Select suitable materials for design
- Understand the concepts of heat treatment and surface modification techniques
- Gain knowledge on materials and their applications in automotive applications
- Analyze the properties of different materials used for automotive structures, engine and transmission systems.
- Gain knowledge on advanced metallic and non- metallic materials.

UNIT I INTRODUCTION

9

Elasticity-forms - Stress and strain relationship in engineering materials - Deformation mechanism - Strengthening material - Strain hardening, alloying, polyphase mixture, martensitic precipitation, dispersion, fiber and texture strengthening - iron carbon diagram.

UNIT II METALLIC MATERIALS

9

Cast irons - types, properties, structures, compositions and applications, plain carbon steels, low alloy steels and effects of alloying elements, high alloy steels, stainless steel types, castability, formability, machinability, hardenability and weldability of the material, high temperature steels and super alloys. Decorative and functional coating materials for automotive parts - Electro less Nickel, Hard Chrome, and, Zirconium Phosphate, Zinc flake, Metal oxides.

UNIT III COMPOSITES 9

Mechanics, Manufacturing and Design. Types of composites. Fiber reinforced plastics (FRP), engineering ceramics, metal matrix composites, silicon carbide, graphite, fibres of zirconia, alumina and boron nitride - metal filaments - boron filaments - glass fibres applications, nanocomposites. Piezoelectric composites.

UNIT IV ELECTRICAL AND MAGNETIC MATERIALS 9

Semiconductors materials, single crystals, soft and hard magnets, superconductors, MEMS materials, nano-materials, smart-materials, shape memory alloys. Piezoelectric materials. Piezoceramic materials, polyvinylidene fluoride, Magnetostrictive Materials. Metglas materials.

UNIT V RUBBER AND PLASTICS MATERIALS 9

Plastics / rubber components in automobiles – function – selection criteria. Structure – property relationship of rubber. Rubber mounts – spring design – comparison with metallic springs – shape factor and its effect. Typical mounts, compounding and manufacture. Seals for static and dynamic applications. Brake fluid / hydraulic hoses, materials and manufacture.

TOTAL: 45 PERIODS

COURSE OUTCOMES

The student will be able to:

- Understand failure mechanisms.
- Gain knowledge on different class of materials and their applications
- Understand the Selection criteria for various components and importance.
- Select proper material for Automobile applications
- Understand different materials used for sensors in a vehicle

REFERENCES

1. Ahmed Elmarakbi, "Advanced Composite Materials for Automotive Applications - Structural Integrity and Crashworthiness", John Wiley & Sons Ltd, 2014.
2. Brian Cantor, Patrick Grant, Colin Johnston, "Automotive Engineering: Lightweight, Functional, and Novel Materials", CRC Press, Taylor & Francis Group, 2006.
3. Geoffrey Davies, "Materials for Automobile Bodies", Butterworth-Heinemann, 2012
4. Hiroshi Yamagata, "The Science and Technology of Materials in Automotive Engines", Woodhead Publishing, 2005
5. Smallman R. E, Bishop R. J, "Modern Physical Metallurgy and Materials Engineering- Science, process, applications", Sixth Edition, Butterworth-Heinemann, 1999

AM4003

SPECIAL PURPOSE VEHICLES

L T P C
3 0 0 3

COURSE OBJECTIVES:

- To enhance the knowledge of the students about the various equipment's used in earth moving, applications.
- To understand the construction and working of the vehicle for constructional application
- To describe the working nature of farm equipment's based on their application.
- To discriminate the various industrial vehicles based on the purpose.
- To acquire the knowledge on the functioning of military vehicle.

COURSE OBJECTIVES:

- To Study the theory, construction and operation of different measurement technology for automobiles
- To understand working principle of various instruments, transducers and their application in automotive industry.
- To acquire knowledge on various mechanical measurement instruments techniques
- To study different types of instruments used for engine testing and its working principle
- To acquire knowledge in experimental methods for testing the vehicle with different instruments

UNIT I MEASUREMENT SYSTEMS**8**

Static and Dynamic Measurement systems-importance of measurement system – methods of measurement -applications - characteristics of measuring system-static and dynamic characteristics of measuring system – Analysis of experimental detail, Error analysis-types of errors-limiting errors

UNIT II TRANSDUCERS, MODIFIERS AND TERMINATING DEVICES**8**

Transducers for Automotive Applications – Amplifiers-Classifications and application in automobile – filters -types – Data Acquisition system - analog and digital type DAS- Indicators, Printers and display device –Signal Analyzing with example of automobile applications.

UNIT III MECHANICAL MEASUREMENT**10**

Instrumentation for Measuring Weight, Force, torque, pressure, power, temperature, fluid flow and special methods, vibration piezo electric effect, rotational speed. Measuring Velocity, acceleration and angular motion with respect to automobile applications

UNIT IV ENGINE EXPERIMENTAL TECHNIQUES**10**

I.S Code for Engine testing – Instrumentation for performance testing of engine, Instrumentation for Research and development, Instrumentation for noise, vibration, in cylinder gas flow, flame temperature Dynamic Cylinder pressure measurements.

UNIT V VEHICLE EXPERIMENTAL TECHNIQUES**9**

Laboratory tests- test tracks - Endurance Tests- crash tests- wind tunnel tests- Dynamic cornering fatigue, dynamic radial fatigue tests – procedure, bending moment and radial load calculations. Impact test – road hazard impact test for wheel and tyre assemblies, test procedures, failure criteria and performance criteria. Bumpers - types of tests, pendulum test, fixed collision barrier test, procedure, performance criteria. Air and hydraulic brake test, air brake actuator, valves test, performance requirements.

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

At the end of this course the student should be able to

- Understand the components of the automotive instruments and their functions and the latest developments in this field
- Understand transducers, modifiers and terminating devices
- Understand mechanical measurement
- Grasp the basics of engine experimental techniques
- Grasp the basics of vehicle experimental techniques

REFERENCES

1. J.G. Giles, 'Engine and Vehicle Testing', Illiffe books Ltd., London, 1988.
2. W. Judge, 'Engineering Precision Measurement', Chapman and Hall Ltd, Essex Street W.C., 1951,
3. Rangan, Sharma and Mani, 'Instrumentation Devices and systems', Tata McGraw Hill Publishing Co., Ltd., 1990
4. T.G. Beckwith and Buck, 'Mechanical Measurements', Oxford and IBH Publishing House, New Delhi, 1995
5. D. Patambis, 'Principle of Industrial Instrumentation', Tata McGraw Hill Publishing Co, New Delhi, 1990.

AM4005

THEORY OF FUELS AND LUBRICANTS

L T P C
3 0 0 3

COURSE OBJECTIVES:

- To identify the processes behind fuel extraction system.
- To understand the theory behind lubrication
- To study the properties of lubricants.
- To elaborate the properties of fuels used in IC engines.
- To understand the need of fuel rating.

UNIT I MANUFACTURE OF FUELS AND LUBRICANTS 9

Structure of petroleum, refining process, fuels, thermal cracking, catalytic cracking, polymerization, alkylation, isomerisation, blending, products of refining process. Manufacture of lubricating oil basestocks, manufacture of finished automotive lubricants.

UNIT II THEORY OF LUBRICATION 9

Engine friction: introduction, total engine friction, effect of engine variables on friction, hydrodynamic lubrication, elasto hydrodynamic lubrication, boundary lubrication, bearing lubrication, functions of the lubrication system, introduction to design of a lubricating system.

UNIT III PROPERTIES AND TESTING OF LUBRICANTS 9

Specific requirements for automotive lubricants, oxidation deterioration and degradation of lubricants, synthetic lubricants, classification of lubricating oils, properties of lubricating oils, tests on lubricants. Grease, classification, properties, test used in grease.

UNIT IV PROPERTIES AND TESTING OF FUELS AND COMBUSTION 9

Thermo-chemistry of fuels, properties and testing of fuels, relative density, calorific value, flash point, fire point, distillation, vapour pressure, spontaneous ignition temperature, viscosity, pour point, flammability, ignitability, diesel index, API gravity, aniline point, carbon residue, copper strip corrosion etc. combustion in SI and CI Engine

UNIT V ADDITIVES FOR LUBRICANTS AND FUELS 9

Additive - mechanism, requirements of additive, petrol fuel additives, diesel fuel additives Additives and additive mechanism, for lubricants. Introduction to Nano fluids

TOTAL : 45 PERIODS

OUTCOMES:

At the end of this course the student should be able to

- Identify the processes behind fuel extraction system.
- Understand the theory behind lubrication
- Study the properties of lubricants.
- Elaborate the properties of fuels used in IC engines.
- Understand the need of fuel rating.

REFERENCES

1. Ganesan. V., "Internal Combustion Engines", Tata McGraw-Hill Publishing Co., New Delhi, 2017.
2. M.L. Mathur, R.P.Sharma "A course in internal combustion engines", Dhanpatrai publication, 2003.
3. A.R.Lansdown – Lubrication – A practical guide to lubricant selection – Pergamon press – 1982.
4. Raymond.C.Gunther – Lubrication – Chilton Book Co., - 1971.
5. Brame, J.S.S. and King, J.G. – Fuels – Solids, Liquids, Gaseous.
6. Francis, W – Fuels and Fuel Technology, Vol. I & II
7. Hobson, G.D. & Pohl.W- Modern Petroleum Technology

AM4006

DESIGN AND ANALYSIS OF EXPERIMENTS

L T P C
3 0 0 3

COURSE OBJECTIVES:

- To identify the key factors in designing experiments
- To develop appropriate experimental design
- To analyse the data to derive valid conclusions.
- To optimize process conditions by developing empirical models.
- To Design robust products and processes using parameter design approach.

UNIT I FUNDAMENTALS OF EXPERIMENTATION 9

Role of experimentation in rapid scientific progress, Historical perspective of experimental approaches, Steps in experimentation, Principles of experimentation.

UNIT II SIMPLE COMPARATIVE EXPERIMENTS 9

Basic concepts of probability and statistics, Comparison of two means and two variances, Comparison of multiple (more than two) means & ANOVA.

UNIT III EXPERIMENTAL DESIGNS 9

Factorial designs, fractional factorial designs, orthogonal arrays, standard orthogonal arrays & interaction tables, modifying the orthogonal arrays, selection of suitable orthogonal array design, analysis of experimental data.

UNIT IV RESPONSE SURFACE METHODOLOGY 9

Concept, linear model, steepest ascent, second order model, regression

UNIT V TAGUCHI'S PARAMETER DESIGN 9

Concept of robustness, noise factors, objective function & S/N ratios, inner-array and outer-array design, data analysis

TOTAL : 45 PERIODS

COURSE OUTCOMES:

- Formulate objective(s) and identify key factors in designing experiments for a given problem.
- Develop appropriate experimental design to conduct experiments for a given problem.
- Analyze experimental data to derive valid conclusions.
- Optimize process conditions by developing empirical models using experimental data.
- Design robust products and processes using parameter design approach.

REFERENCES

1. Montgomery DC, Design and Analysis of Experiments, 7th Edition, John Wiley & Sons, NY, 2008.
2. Ross PJ, Taguchi Techniques for Quality Engineering, McGraw-Hill Book Company, NY, 2008.



AUDIT COURSES

AX4091

ENGLISH FOR RESEARCH PAPER WRITING

L T P C
2 0 0 0

COURSE OBJECTIVES

- Teach how to improve writing skills and level of readability
- Tell about what to write in each section
- Summarize the skills needed when writing a Title
- Infer the skills needed when writing the Conclusion
- Ensure the quality of paper at very first-time submission

UNIT I INTRODUCTION TO RESEARCH PAPER WRITING

6

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT II PRESENTATION SKILLS

6

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction

UNIT III TITLE WRITING SKILLS

6

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check

UNIT IV RESULT WRITING SKILLS

6

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

UNIT V VERIFICATION SKILLS

6

Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first- time submission

TOTAL: 30 PERIODS

COURSE OUTCOMES

- CO1 –Understand that how to improve your writing skills and level of readability
- CO2 – Learn about what to write in each section
- CO3 – Understand the skills needed when writing a Title
- CO4 – Understand the skills needed when writing the Conclusion
- CO5 – Ensure the good quality of paper at very first-time submission

REFERENCES

1. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011
2. Day R How to Write and Publish a Scientific Paper, Cambridge University Press 2006
3. Goldbort R Writing for Science, Yale University Press (available on Google Books) 2006
4. Highman N, Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book 1998.

COURSE OBJECTIVES

- Summarize basics of disaster
- Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Develop the strengths and weaknesses of disaster management approaches

UNIT I INTRODUCTION 6

Disaster: Definition, Factors and Significance; Difference between Hazard And Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

UNIT II REPERCUSSIONS OF DISASTERS AND HAZARDS 6

Economic Damage, Loss of Human and Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

UNIT III DISASTER PRONE AREAS IN INDIA 6

Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides And Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference To Tsunami; Post-Disaster Diseases and Epidemics

UNIT IV DISASTER PREPAREDNESS AND MANAGEMENT 6

Preparedness: Monitoring Of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological And Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT V RISK ASSESSMENT 6

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival

TOTAL : 30 PERIODS**COURSE OUTCOMES**

- CO1: Ability to summarize basics of disaster
- CO2: Ability to explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- CO3: Ability to illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- CO4: Ability to describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- CO5: Ability to develop the strengths and weaknesses of disaster management approaches

REFERENCES

1. Goel S. L., Disaster Administration And Management Text And Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi, 2009.
2. Nishitha Rai, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "NewRoyal book Company, 2007.
3. Sahni, Pardeep Et. Al. , " Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi, 2001.

AX4093

CONSTITUTION OF INDIA

L T P C
2 0 0 0

OBJECTIVES

Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional Role and entitlement to civil and economic rights as well as the emergence nation hood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

UNIT I HISTORY OF MAKING OF THE INDIAN CONSTITUTION

History, Drafting Committee, (Composition & Working)

UNIT II PHILOSOPHY OF THE INDIAN CONSTITUTION

Preamble, Salient Features

UNIT III CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES

Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT IV ORGANS OF GOVERNANCE

Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

UNIT V LOCAL ADMINISTRATION

District's Administration head: Role and Importance, □ Municipalities: Introduction, Mayor and role of Elected Representative, CEO, Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

UNIT VI ELECTION COMMISSION

Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners - Institute and Bodies for the welfare of SC/ST/OBC and women.

TOTAL: 30 PERIODS

OUTCOMES

Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization
- of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party[CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

SUGGESTED READING

- The Constitution of India,1950(Bare Act),Government Publication.
- Dr.S.N.Busi, Dr.B. R.Ambedkar framing of Indian Constitution,1st Edition, 2015.
- M.P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis,2014.
- D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

AX4094

நற்றமிழ் இலக்கியம்

L T P C
2 0 0 0

UNIT I

சங்க இலக்கியம்

6

1. தமிழின் துவக்க நூல் தொல்காப்பியம்
- எழுத்து, சொல், பொருள்
2. அகநானூறு (82)
- இயற்கை இன்னிசை அரங்கம்
3. குறிஞ்சிப் பாட்டின் மலர்க்காட்சி
4. புறநானூறு (95,195)
- போரை நிறுத்திய ஔவையார்

UNIT II

அறநெறித் தமிழ்

6

1. அறநெறி வகுத்த திருவள்ளுவர்
- அறம் வலியுறுத்தல், அன்புடைமை, ஒப்புறவு அறிதல், ஈகை, புகழ்
2. பிற அறநூல்கள் - இலக்கிய மருந்து
- ஏலாதி, சிறுபஞ்சமூலம், திரிகடுகம், ஆசாரக்கோவை (தூய்மையை வலியுறுத்தும் நூல்)

UNIT III

இரட்டைக் காப்பியங்கள்

6

1. கண்ணகியின் புரட்சி
- சிலப்பதிகார வழக்குரை காதை
2. சமூகசேவை இலக்கியம் மணிமேகலை
- சிறைக்கோட்டம் அறக்கோட்டமாகிய காதை

UNIT IV

அருள்நெறித் தமிழ்

6

1. சிறுபாணாற்றுப்படை
- பாரி முல்லைக்குத் தேர் கொடுத்தது, பேகன் மயிலுக்குப் போர்வை கொடுத்தது, அதியமான் ஔவைக்கு நெல்லிக்கனி கொடுத்தது, அரசர் பண்புகள்

2. நற்றிணை
 - அன்னைக்குரிய புன்னை சிறப்பு
 3. திருமந்திரம் (617, 618)
 - இயமம் நியமம் விதிகள்
 4. தர்மச்சாலையை நிறுவிய வள்ளலார்
 5. புறநானூறு
 - சிறுவனே வள்ளலானான்
 6. அகநானூறு (4) - வண்டு
 - நற்றிணை (11) - நண்டு
 - கலித்தொகை (11) - யானை, புறா
 - ஐந்திணை 50 (27) - மான்
- ஆகியவை பற்றிய செய்திகள்

UNIT V

நவீன தமிழ் இலக்கியம்

6

1. உரைநடைத் தமிழ்,
 - தமிழின் முதல் புதினம்,
 - தமிழின் முதல் சிறுகதை,
 - கட்டுரை இலக்கியம்,
 - பயண இலக்கியம்,
 - நாடகம்,
2. நாட்டு விடுதலை போராட்டமும் தமிழ் இலக்கியமும்,
3. சமுதாய விடுதலையும் தமிழ் இலக்கியமும்,
4. பெண் விடுதலையும் விளிம்பு நிலையினரின் மேம்பாட்டில் தமிழ் இலக்கியமும்,
5. அறிவியல் தமிழ்,
6. இணையத்தில் தமிழ்,
7. சுற்றுச்சூழல் மேம்பாட்டில் தமிழ் இலக்கியம்.

TOTAL: 30 PERIODS

தமிழ் இலக்கிய வெளியீடுகள் / புத்தகங்கள்

1. தமிழ் இணைய கல்விக்கழகம் (Tamil Virtual University)
 - www.tamilvu.org
2. தமிழ் விக்கிப்பீடியா (Tamil Wikipedia)
 - https://ta.wikipedia.org
3. தர்மபுர ஆதின வெளியீடு
4. வாழ்வியல் களஞ்சியம்
 - தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்
5. தமிழ்கலைக் களஞ்சியம்
 - தமிழ் வளர்ச்சித் துறை (thamilvalarchithurai.com)
6. அறிவியல் களஞ்சியம்
 - தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்