

ACADEMIC YEAR (2021-2022)



J.K.K.MUNIRAJAH COLLEGE OF TECHNOLOGY
T.N.Palayam(po),Gobi(tk)-638506, Erode(dt).

Metric No 1.3.2

S.No	Name of the course	course code	programme offering	project work	internship	Number of students
(2021-2022) Regulation-2017						
1	Project Work	AT8811	AUTOMOBILE ENGINEERING	✓		3
2	Automotive Chassis	AT8402	AUTOMOBILE ENGINEERING	✓	✓	3
3	Two and Three Wheelers	AT8603	AUTOMOBILE ENGINEERING	✓	✓	3
4	Design of Machine Elements	ME8593	AUTOMOBILE ENGINEERING	✓		1
5	Vehicle Maintenance	AT8702	AUTOMOBILE ENGINEERING	✓		2
6	Vehicle Body Engineering	AT8801	AUTOMOBILE ENGINEERING	✓		3
7	Manufacturing Technology	ME8392	AUTOMOBILE ENGINEERING		✓	2
8	New Generation and Hybrid Vehicles	AT8004	AUTOMOBILE ENGINEERING	✓		1

Seedh
PRINCIPAL

J.K.K. MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (TK), ERODE (Dt).

AT8811

PROJECT WORK

LT PC
002010

OBJECTIVE:

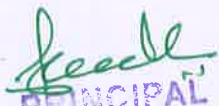
- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 300 PERIODS

OUTCOME:

- On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.


PRINCIPAL
JKK MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (TK), ERODE (Dt).

OBJECTIVE:

- Study of the Constructional details and Theory of important drive line, Structural, Steering, Braking and Suspension Systems of Automobiles. Problem-Solving in Steering Mechanism, Propeller Shaft, Braking and Suspension Systems are to be done.

UNIT I LAYOUT, FRAME, FRONT AXLE AND STEERING SYSTEM 9

Basic construction of chassis, Types of Chassis layout, with reference to Power Plant location and drive, various, types of frames, Loads acting on vehicle frame, Types of Front Axles and Stub Axles, Front Wheel Geometry. Condition for True Rolling Motion. Ackerman's and Davi's Steering Mechanisms, Steering Linkages, Different Types of Steering Gear boxes, Slip Angle, Over-Steer and Under-Steer, Reversible and Irreversible Steering, Power Steering.

UNIT II DRIVE LINE, FINAL DRIVE AND DIFFERENTIAL 9

Driving Thrust and its effects, torque reactions and side thrust, Hotchkiss drive, torque tube drive, radius rods and stabilizers, Propeller Shaft, Universal Joints, Constant Velocity Universal Joints, Final drive, different types of final drive, Worm and Worm wheel, straight bevel gear, spiral bevel gear and hypoid gear final drive. Differential principle. Constructional details of differential unit, Differential housings, Non-Slip differential, Differential locks.

UNIT III REAR AXLES, WHEELS, RIMS AND TYRES 9

Construction of rear axles, Types of Loads acting on rear axles, Full -Floating, Three-Quarter Floating and Semi-Floating Axles, Twist beam rear axle, Types, Multi axles vehicles. Wheels and Rims, Types of Tyres and their constructional details.

UNIT IV SUSPENSION SYSTEM 9

Requirement of Suspension System, Types of Suspension Springs, Constructional details and characteristics of Single Leaf, Multi-Leaf spring, Coil and Torsion bar Springs, Rubber, Pneumatic and Hydro - elastic Suspension Spring Systems, Independent Suspension System, Shock Absorbers, Types and Constructional details of Leaf and Coil Springs.

UNIT V BRAKE SYSTEMS 9

Need for Brake systems, Stopping Distance, Time and Braking Efficiency, Effect of Weight Transfer during Braking, Classification of brakes, Braking Torque, drum brake and disc Brake Theory, Types and Construction of Hydraulic Braking System, Mechanical Braking System, Pneumatic Braking System, Power-Assisted Braking System, Servo Brakes, Retarders - antilock braking systems(ABS).

TOTAL : 45 PERIODS**OUTCOME:**


- The students will understand the constructional, working principle of various sub system of an automobile.

TEXT BOOKS

1. Newton Steeds and Garret, "Motor Vehicles" 13th Edition, Butterworth, London, 2005.
2. Heinz Hazler, "Modern Vehicle Technology", Butterworth, London, 2005.
3. Devaradjane. Dr. G., Dr. M. Kumaresan, "Automobile Engineering", AMK Publishers, 2013.

REFERENCES

1. Heldt P.M., "Automotive Chassis" Chilton Co., New York, 1990
2. Giri. N.K., "Automotive Mechanics" Khanna Publishers, New Delhi, 2005.
3. Milliken & Milliken, "Race Car Vehicle Dynamics", SAE, 1995


PRINCIPAL
JKK MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

OBJECTIVE:

- The aim of this course is to make the students to know and understand the constructional details operating characteristics and vehicle design aspects

UNIT I THE POWER UNIT

9

Two stroke and four stroke SI & CI engine Construction and Working, merits and demerits, Symmetrical and unsymmetrical valve & port timing diagrams. Scavenging process.

UNIT II FUEL AND IGNITION SYSTEMS

9

Fuel system – Different circuits in two wheeler fuel systems, fuel injection system. Lubrication system, Ignition systems - Magneto coil and battery coil spark ignition system, Electronic ignition System, Starting system - Kick starter system – Self starter system. Recent technologies.

UNIT III CHASSIS AND SUB-SYSTEMS

9

Main frame for two and three wheelers, its types, Chassis and different drive systems for two wheelers, Single, multiple plates and centrifugal clutches, Gear box and its and various gear controls in two wheelers. Front and rear suspension systems. Shock absorbers. Panel meters and controls on handle bar, Freewheeling devices

UNIT IV BRAKES AND WHEELS

8

Drum brakes & Disc brakes Construction and Working and its Types, Front and Rear brake links layouts. Brake actuation mechanism. Spoked wheel, cast wheel, Disc wheel & its merits and demerits. Tyres and tubes Construction & its Types. Steering geometry.

UNIT V TWO & THREE WHEELERS – CASE STUDY

10

Case study of Sports bike, Motor cycles, Scooters and Mopeds - Auto rickshaws, Pick up van, Delivery van and Trailer. Servicing and maintenance. Recent developments.

TOTAL : 45 PERIODS**OUTCOME:**

- The students can able to understand the various subsystem of two and three wheeler and also know how it is different from light motors and heavy motor vehicles.

TEXT BOOK:

- Irving,P.E., "Motor cycle Engineering", Temple Press Book, London, 1992.

REFERENCES:

- Bryaut, R.V., Vespa "Maintenance and Repair series".
- Marshall Cavendish, Encyclopedia of Motor cycling, 20 volumes, New York and London, 1989.
- Ramalingam. K. K., "Two Wheelers", Scitech publications, Chennai,2009
- Raymond Broad Lambretta – "A practical guide to maintenance and repair", 1987.
- The Cycle Motor Manual, Temple Press Ltd., London, 1990.


PRINCIPAL

**JKK MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (TK), ERODE (Dt).**

OBJECTIVES

- To familiarize the various steps involved in the Design Process
- To understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements.
- To learn to use standard practices and standard data
- To learn to use catalogues and standard machine components
(Use of P S G Design Data Book is permitted)

UNIT I STEADY STRESSES AND VARIABLE STRESSES IN MACHINE MEMBERS 9

Introduction to the design process - factors influencing machine design, selection of materials based on mechanical properties - Preferred numbers, fits and tolerances – Direct, Bending and torsional stress equations – Impact and shock loading – calculation of principle stresses for various load combinations, eccentric loading – curved beams – crane hook and 'C' frame- Factor of safety - theories of failure – Design based on strength and stiffness – stress concentration – Design for variable loading.

UNIT II SHAFTS AND COUPLINGS 9

Design of solid and hollow shafts based on strength, rigidity and critical speed – Keys, keyways and splines - Rigid and flexible couplings.

UNIT III TEMPORARY AND PERMANENT JOINTS 9

Threaded fastners - Bolted joints including eccentric loading, Knuckle joints, Cotter joints – Welded joints, riveted joints for structures - theory of bonded joints.

UNIT IV ENERGY STORING ELEMENTS AND ENGINE COMPONENTS 9 Various types of springs, optimization of helical springs - rubber springs - Flywheels considering stresses in rims and arms for engines and punching machines- Connecting Rods and crank shafts.

UNIT V BEARINGS 9

Sliding contact and rolling contact bearings - Hydrodynamic journal bearings, Sommerfeld Number, Raimondi and Boyd graphs, – Selection of Rolling Contact bearings.

TOTAL: 45 PERIODS**OUTCOMES:**

Upon the completion of this course the students will be able to

- CO1 Explain the influence of steady and variable stresses in machine component design.
- CO2 Apply the concepts of design to shafts, keys and couplings.
- CO3 Apply the concepts of design to temporary and permanent joints.
- CO4 Apply the concepts of design to energy absorbing members, bearings and connecting rod.
- CO5 Apply the concepts of design to bearings.

TEXT BOOKS:

1. Bhandari V, "Design of Machine Elements", 4th Edition, Tata McGraw-Hill Book Co, 2016.
2. Joseph Shigley, Charles Mischke, Richard Budynas and Keith Nisbett "Mechanical Engineering Design", 9th Edition, Tata McGraw-Hill, 2011.

REFERENCES:

3. Alfred Hall, Halowenko, A and Laughlin, H., "Machine Design", Tata McGraw-Hill BookCo.(Schaum's Outline), 2010
4. Ansel Ugural, "Mechanical Design – An Integral Approach", 1st Edition, Tata McGraw-Hill Book Co, 2003.
5. P.C. Gope, "Machine Design – Fundamental and Application", PHI learning private ltd, New Delhi, 2012.
6. R.B. Patel, "Design of Machine Elements", MacMillan Publishers India P Ltd. Tech Max Educational resources, 2011.

[Signature]
PRINCIPAL
JKK MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (TK), ERODE (Dt).

OBJECTIVE:

- To know about the various methods of maintaining vehicles and their subsystems.

UNIT I MAINTENANCE, WORKSHOP PRACTICES, SAFETY AND TOOLS 10

Maintenance – Need, importance, primary and secondary functions, policies - classification of maintenance work - vehicle insurance - basic problem diagnosis. Automotive service procedures – workshop operations – workshop manual - vehicle identification. Safety – Personnel, machines and equipment, vehicles, fire safety - First aid. Basic tools – special service tools – measuring instruments – condition checking of seals, gaskets and sealants. Scheduled maintenance services – service intervals - Towing and recovering.

UNIT II ENGINE AND ENGINE SUBSYSTEM MAINTENANCE 8

General Engine service- Dismantling of Engine components- Engine repair- working on the underside, front, top, ancillaries- Service of basic engine parts, cooling and lubricating system, fuel system, Intake and Exhaust system, electrical system - Electronic fuel injection and engine management service - fault diagnosis- servicing emission controls

UNIT III TRANSMISSION AND DRIVELINE MAINTENANCE 8

Clutch- general checks, adjustment and service- Dismantling, identifying, checking and reassembling transmission, transaxle- road testing- Removing and replacing propeller shaft, servicing of cross and yoke joint and constant velocity joints- Rear axle service points- removing axle shaft and bearings- servicing differential assemblies- fault diagnosis.

UNIT IV STEERING, BRAKE, SUSPENSION, WHEEL MAINTENANCE 10

Inspection, Maintenance and Service of Hydraulic brake, Drum brake, Disc brake, Parking brake. Bleeding of brakes. Inspection, Maintenance and Service of Mc person strut, coil spring, leaf spring, shock absorbers. Dismantling and assembly procedures. Wheel alignment and balance, removing and fitting of tyres, tyre wear and tyre rotation. Inspection, Maintenance and Service of steering linkage, steering column, Rack and pinion steering, Recirculating ball steering service- Worm type steering, power steering system

UNIT V AUTO ELECTRICAL AND AIR CONDITIONING MAINTENANCE 9

Maintenance of batteries, starting system, charging system and body electrical -Fault diagnosis using Scan tools. Maintenance of air conditioning parts like compressor, condenser, expansion valve, evaporator - Replacement of hoses- Leak detection- AC Charging- Fault diagnosis Vehicle body repair like panel beating, tinkering, soldering, polishing, painting.

TOTAL : 45 PERIODS**OUTCOME:**

- Upon the completion of the course, the student can able to understand the importance of maintenance and also the step by step procedure for maintain the various automotive sub systems

TEXT BOOKS:

- Ed May, "Automotive Mechanics Volume One" and Two , Mc Graw Hill Publications, 2003
- Vehicle Service Manuals of reputed manufacturers

REFERENCE:

- Bosch Automotive Handbook, Sixth Edition, 2004


PRINCIPAL**MUNIRAJAH COLLEGE
OF TECHNOLOGY****T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).**

OBJECTIVE:

- The main objective of this course is to impart knowledge in the construction of vehicle, aerodynamic, concept, paneling of passenger car body trim. At the end of the course the student will be well versed in the design and construction of external body of the vehicles.

UNIT I CAR BODY DETAILS 10
Types of Car body - Saloon, convertibles, Limousine, Estate Van, Racing and Sports car – Visibility-regulations, driver's visibility, improvement in visibility and tests for visibility. Driver seat design -Car body construction-Variou panels in car bodies. Safety aspect of car body.

UNIT II BUS BODY DETAILS 9
Types of bus body: based on capacity, distance traveled and based on construction.– Bus body lay out for various types, Types of metal sections used – Regulations – Constructional details: Conventional and integral. driver seat design- Safety aspect of bus body.

UNIT III COMMERCIAL VEHICLE DETAILS 8
Types of commercial vehicle bodies - Light commercial vehicle body. Construction details of commercial vehicle body - Flat platform body, Trailer, Tipper body and Tanker body – Dimensions of driver's seat in relation to controls – Drivers cab design - Regulations.

UNIT IV VEHICLE AERODYNAMICS 9
Objectives, Vehicle drag and types. Various types of forces and moments. Effects of forces and moments. Side wind effects on forces and moments. Various body optimization techniques for minimum drag. Wind tunnels – Principle of operation, Types. Wind tunnel testing such as: Flow visualization techniques, Airflow management test – measurement of various forces and moments by using wind tunnel.

UNIT V BODY MATERIALS, TRIM, MECHANISMS AND BODY REPAIR 9
Types of materials used in body construction-Steel sheet, timber, plastics, GRP, properties of materials. Body trim items-body mechanisms.Hand tools-power tools-panel repair-repairing sheet metal-repairing plastics-body fillers-passenger compartment service- corrosion: Anticorrosion methods, Modern painting process procedure-paint problems

TOTAL : 45 PERIODS**OUTCOMES**

Upon completion of the course, students will

- Know about different aspects of car body and bus body, types, commercial vehicle.
- Role of various aerodynamic forces and moments, measuring instruments
- Know about the material used in body building, tools used, body repairs.

TEXT BOOKS:

1. James E Duffy, "Body Repair Technology for 4-Wheelers", Cengage Learning, 2009.
2. Powloski, J., "Vehicle Body Engineering", Business Books Ltd., 1998.

REFERENCES:

1. Braithwaite, J.B., "Vehicle Body building and drawing", Heinemann Educational Books Ltd., London, 1997.
2. Dieler Anselm., The passenger car body, SAE International, 2000
3. Giles, G.J., "Body construction and design", Illiffe Books Butterworth & Co., 1991.
4. John Fenton, "Vehicle Body layout and analysis", Mechanical Engg. Publication Ltd. London, 1992.

OBJECTIVE:

- The automobile components such as piston, connecting rod, crankshaft, engine block, front axle, frame, body etc., are manufactured by various types of production processes involving casting, welding, machining, metal forming, power metallurgy etc. Hence B.E. Automobile Engineering students must study this course Production Technology.

UNIT I CASTING

8

Casting types, procedure to make sand mould, types of core making, moulding tools, machine moulding, special moulding processes – CO₂ moulding; shell moulding, investment moulding, permanent mould casting, pressure die casting, centrifugal casting, continuous casting, casting defects.

UNIT II WELDING

8

Classification of welding processes. Principles of Oxy-acetylene gas welding. A.C metal arc welding, resistance welding, submerged arc welding, tungsten inert gas welding, metal inert gas welding, plasma arc welding, thermit welding, electron beam welding, laser beam welding, defects in welding, soldering and brazing.

UNIT III MACHINING

13

General principles (with schematic diagrams only) of working and commonly performed operations in the following machines: Lathe, Shaper, Planer, Horizontal milling machine, Universal drilling machine, Cylindrical grinding machine, Capstan and Turret lathe. Basics of CNC machines. General principles and applications of the following processes: Abrasive jet machining, Ultrasonic machining, Electric discharge machining, Electro chemical machining, Plasma arc machining, Electron beam machining and Laser beam machining.

UNIT IV FORMING AND SHAPING OF PLASTICS

7

Types of plastics - Characteristics of the forming and shaping processes – Moulding of Thermoplastics – Working principles and typical applications of - Injection moulding – Plunger and screw machines – Blow moulding – Rotational moulding – Film blowing – Extrusion - Typical industrial applications – Thermoforming – Processing of Thermosets – Working principles and typical applications - Compression moulding – Transfer moulding – Bonding of Thermoplastics – Fusion and solvent methods – Induction and Ultrasonic methods

UNIT V METAL FORMING AND POWDER METALLURGY

9

Principles and applications of the following processes: Forging, Rolling, Extrusion, Wire drawing and Spinning, Powder metallurgy – Principal steps involved advantages, disadvantages and limitations of powder metallurgy.

TOTAL: 45 PERIODS**OUTCOME:**

- The Students can able to use different manufacturing process and use this in industry for component production

TEXT BOOKS

- Hajra Choudhury, "Elements of Workshop Technology", Vol. I and II, Media Promoters and Publishers Pvt., Ltd., Mumbai, 2005.
- Nagendra Parashar B.S. and Mittal R.K., "Elements of Manufacturing Processes", Prentice-Hall of India Private Limited, 2007

REFERENCES

- Adithan. M and Gupta. A.B., "Manufacturing Technology", New Age, 2006.
- "H.M.T. Production Technology – Handbook", Tata McGraw-Hill, 2000.
- Jain. R.K. and S.C. Gupta, "Production Technology", Khanna Publishers. 16th Edition, 2001.
- Roy. A. Linberg, "Process and Materials of Manufacture", PHI, 2000.
- Serope Kalpajian, Steven R.Schmid, "Manufacturing Processes for Engineering Materials", Fourth Edition, Pearson Education, Inc. 2007.



PRINCIPAL

JKK MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).

OBJECTIVE:

- To illustrate the new generation vehicles and their operation and controls

UNIT I INTRODUCTION

7

Electric and hybrid vehicles, flexible fuel vehicles (FFV), solar powered vehicles, vehicles, fuel cells vehicles.

UNIT II POWER SYSTEM AND NEW GENERATION VEHICLES

12

Hybrid Vehicle engines, Stratified charge engines, lean burn engines, low heat rejection engines, hydrogen engines, HCCI engine, VCR engine, surface ignition engines, VVTI engines. High energy and power density batteries, fuel cells, flexible fuel systems.

UNIT III VEHICLE OPERATION AND CONTROL

9

Computer Control for pollution and noise control and for fuel economy – Transducers and actuators - Information technology for receiving proper information and operation of the vehicle like optimum speed and direction.

UNIT IV VEHICLE AUTOMATED TRACKS

9

Preparation and maintenance of proper road network - National highway network with automated roads and vehicles - Satellite control of vehicle operation for safe and fast travel, GPS.

UNIT V SUSPENSION, BRAKES, AERODYNAMICS AND SAFETY

8

Air suspension – Closed loop suspension, compensated suspension, anti skid braking system, retarders, regenerative braking, safety gauge air bags- crash resistance. Aerodynamics for modern vehicles, safety systems, materials and standards.

TOTAL: 45 PERIODS**OUTCOME:**

- Upon completion of this course the student will familiar in the recent development pertain to energy system, vehicle operation, newer vehicle, recent technologies in the area of suspension systems, brakes, aerodynamics etc

TEXT BOOKS:

1. Bosch Hand Book, SAE Publication, 2000
2. Heinz, "Modern Vehicle Technology" Second Edition

REFERENCES:

1. Advance hybrid vehicle power transmission, SAE.
2. Light weight electric for hybrid vehicle design.
3. Noise reduction, Branek L.L., McGraw Hill Book company, New York, 1993.



PRINCIPAL
JKK MUNIRAJAH COLLEGE
OF TECHNOLOGY
T.N. PALAYAM (Po)-638 506.
GOBI (Tk), ERODE (Dt).