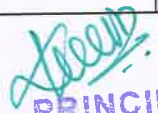


ACADEMIC YEAR (2022-2023)						
		J.K.K.MUNIRAJAH COLLEGE OF TECHNOLOGY T.N.Palayam(po),Gobi(tk)-638506, Erode(dt).			Metric No 1.3.2	
S.No	Name of the course	course code	programme offering	project work	internship	Number of students
(2022-2023) Regulation-2017						
1	Project Work	AT8811	AUTOMOBILE ENGINEEREING	✓		9
2	Two and Three Wheelers	AT8603	AUTOMOBILE ENGINEEREING	✓	✓	6
3	Engineering Metallurgy	ME8491	AUTOMOBILE ENGINEEREING	✓		3
4	Vehicle Maintenance	AT8702	AUTOMOBILE ENGINEEREING	✓	✓	6
5	Composite Materials and Mechanics	ME8092	AUTOMOBILE ENGINEEREING	✓		3
6	Manufacturing Technology	ME8392	AUTOMOBILE ENGINEEREING	✓	✓	3

  
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**T.N. PALAYAM (Po)-638 506.**  
**GOBI (Tk), ERODE (Dt).**



## J.K.K. MUNIRAJAH COLLEGE OF TECHNOLOGY

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Accredited by NAAC with "A" Grade

T.N. Palayam (Po), Gobi (Tk), Erode (Dt) – 638 506

### AUTOMOBILE ENGINEERING

2022-2023

S.NO	REG.NO	STUDENT NAME	PROJECT	INTERNSHIP
1	731219102001	AJAY KRISHNA	✓	✓
2	731219102002	ARAVINTH R	✓	
3	731219102003	DHINESH KUMAR K	✓	
4	731219102004	HARIPRASATH T	✓	✓
5	731219102007	SIRANJEEVI G	✓	✓
6	731219102008	UMAMAHESWARAN D	✓	
7	731219102301	MOHAN KUMAR M	✓	✓
8	731219102302	RAJ R	✓	✓
9	731219102303	SANJAY KRISHNAN S	✓	✓

  
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**AUTOMOBILE ENGINEERING**

S.No	Name of the Course that include experiential learning through Project Work/Internship/Field Visit
1	Project Work
2	Two and Three Wheelers
3	Engineering Metallurgy
4	Vehicle Maintenance
5	Composite Materials and Mechanics
6	Manufacturing Technology

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# **PROJECT WORK**

AT8811

**PROJECT WORK**

L T P C  
0 0 20 10

**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.



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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.


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**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

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**TEXT BOOKS:**

1. Avner,, S.H., "Introduction to Physical Metallurgy", McGraw Hill Book Company,1997.
2. Williams D Callister, "Material Science and Engineering" Wiley India Pvt Ltd, Revised Indian Edition 2014

**REFERENCES:**

1. Kenneth G.Budinski and Michael K. Budinski, "Engineering Materials", Prentice Hall of India Private Limited, 2010.
2. Raghavan.V, "Materials Science and Engineering", Prentice Hall of India Pvt. Ltd., 2015.
3. U.C.Jindal : Material Science and Metallurgy, "Engineering Materials and Metallurgy", First Edition, Dorling Kindersley, 2012
4. Upadhyay. G.S. and Anish Upadhyay, "Materials Science and Engineering", Viva Books Pvt.Ltd., New Delhi, 2006.



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**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 – CO<sub>2</sub> 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. 16<sup>th</sup> Edition, 2001.
- Roy. A. Linberg, "Process and Materials of Manufacture", PHI, 2000
- SeropeKalpajian, Steven R.Schmid, "Manufacturing Processes for Engineering Materials", Fourth Edition, Pearson Education, Inc. 2007.

**FABRICATION OF REGENERATIVE CLUTCH FOR  
POWER GENERATION**

**A PROJECT REPORT**

**Submitted by**

**HARIPRASATH. T (731219102004)**

**SIRANJEEVI. G (731219102007)**

**SANJAYKRISHNAN. S (731219102303)**

*In partial fulfilment of the award of the degree*

*of*

**BACHELOR OF ENGINEERING**

*in*

**AUTOMOBILE ENGINEERING**

**J.K.K. MUNIRAJAH COLLEGE OF TECHNOLOGY**

**T.N.PALAYAM-638506**



*[Signature]*  
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**T.N. PALAYAM (Po)-638 506.**  
**GOBI (TK), ERODE (Dt).**

**ANNA UNIVERSITY: CHENNAI-600 025**

**MAY 2023**

ANNA UNIVERSITY: CHENNAI-600 025

**BONAFIDE CERTIFICATE**

Certified that this project report "FABRICATION OF REGENERATIVE CLUTCH FOR POWER GENERATION" is the bonafide work of

**HARIPRASATH. T** (731219102004)

**SIRANJEEVI. G** (731219102007)

**SANJAYKRISHNAN. S** (731219102303)

Who carried out the project work under my supervision

  
SIGNATURE

**Mr.V. MAGESH,M.E.,**  
**HEAD OF THE DEPARTMENT**  
**ASSISTANT PROFESSOR**

Department of Automobile Engineering  
J.K.K.Munirajah College of Technology  
T.N.Palayam-638506


  
SIGNATURE

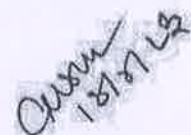
**Mr.V.P.ARULMURUGAN.,M.E**  
**SUPERVISOR**  
**ASSISTANT PROFESSOR**

Department of Automobile Engineering  
J.K.K.Munirajah College of Technology  
T.N.Palayam-638506

Submitted for the project examination held on 18/08/2023

  
INTERNAL EXAMINER


  
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**T.N. PALAYAM (Po)-638 506.**  
**GOBI (TK), ERODE (Dt).**

  
EXTERNAL EXAMINER

## ABSTRACT

The electromagnetic clutch is a type of clutch that is used to transmit power from a driving member to driven member without any mechanical linkages. Electromagnetic clutch which exists already have some problem like wear and slip. This equipment has been mainly developed for utilizing the clutch operation in four wheelers or two wheelers. By using regenerative clutch, we have generated the electrical power through clutching system. In some vehicles electrical accessories are fitted to provide good look to vehicle, but it needs more electric power than the power generated by vehicle battery to work. So we are using a dynamo for producing the electric power with the arrangement of clutching system. The newly generated electromagnetic clutch is free from slipping hence smooth power produced, so there is no way of wear problem occurs. This new electromagnetic clutch has only no linkages so takes less space in vehicles.

Keywords: Regenerative clutch, Electromagnetic Clutch, dynamo

  
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## CHAPTER: 9


### CONCLUSIONS

The project carried out by us will make an impressive mark in the field of automobile. This project has also reduced the cost involved in the concern. The project has been designed to perform the required task taking minimum time.

Regenerative clutch is an effective method of improving vehicle efficiency and longevity. The regenerative clutch

system used in the vehicles satisfies the purpose of saving a part of the energy lost during clutch applied. Regenerative clutch system has a wide scope for further development and the energy savings. The use of more efficient systems could lead to huge savings in the economy of any country. It is very usefully for recover the energy waste from clutch system.

The miraculous thing about regenerative clutch is that it may be able to capture as much as half of that wasted energy and put it back to work. This project has also reduced the cost involved in the concern. The project has been designed to perform the required task taking minimum time. The lower operating and environment costs a vehicle with regenerative clutch system should make it more attractive than conventional one. The traditional cost of the system could be recovered in few years only

  
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# **INTERNSHIP**

**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.

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**TOTAL: 45 PERIODS****OUTCOME:**

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T.N. PALAYAM (Po)-638 506.  
GOBI (TK) ERODE (Dt).



## Internship

1 message

MON 20 MAR 2023 at 2.30pm

From: MAGESHV <hodauto@jkkmct.edu.in>  
Date: MON 20 MAR 2023 at 2.30pm  
Subject: Internship -reg  
To: SAKTHIGEARS <hr@sakthigear.com>


Dear Sir,

I am requesting to be joining your **SAKTHI GEAR PRODUCTS** regarding internship from **28.3.2023** to **11.5.2023**. The requirements are exactly what I have prepared for and hoped to do. I feel confident that I can make a significant contribution to your organization while at the same time learning from your staff.

Refer the following student: **(HARIPRASATH.T, SIRANJEEVI.G, SANJAYKRISHNAN.S)**

Sincerely,

Head Of The Department,  
J.K.K. Munirajah College of Technology,  
T.N.Palayam, Erode-638506, Tamilnadu.

  
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JKK MUNIRAJAH COLLEGE  
OF TECHNOLOGY  
T.N. PALAYAM (Po)-638 506.  
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---

**Internship**

1 message

---

FRI 24 MAR 2023 at 3.30pm

From: SAKTHIGEARS <hr@sakthigear.com >

Date: FRI 24 MAR 2023 at 3.30pm

Subject: Internship-reg

To: MAGESHV <hodauto@jkkmct.edu.in>

Dear Sir,


I am writing to confirm my acceptance of your internship offer of **28.3.2023 TO 11.5.2023** and to be joining my **SAKTHI GEAR PRODUCTS**.

Additionally, I shall complete all insurance forms for the new intern orientation. I look forward to working with you and your fine team. I appreciate your confidence in me and providing the chance to work with us.

Refer the following student: (**HARIPRASATH.T, SIRANJEEVI.G, SANJAYKRISHNAN.S**)

Sincerely,

HRManager,  
Sakthi Gear Products,  
Coimbatore.

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

# SAKTHI GEAR PRODUCTS



## INTERNSHIP CERTIFICATE

### TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. HARIPRASATH .T**, IV Year student B.E. Automobile Engineering, J.K.K. Munirajah College of Technology, T.N. Palayam has successfully completed 45 days (28.03.2023 to 11.05.2023) **internship** in “ **SAKTHI GEAR PRODUCTS PRIVATE LIMITED COIMBATORE.** ”

He has worked on project titled “ **FABRICATION OF REGENERATIVE CLUTCH FOR POWER GENERATION** ”

During this tenure **HARIPRASATH.T** has involved in his work with dedication. We found him pretty and active in whatever the task we have given him. He is a confident person, punctual, hardworking and inquisitive. His Conduct and character was good during the internship period.

Coimbatore  
11.05.2023

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GOBI (Tk), ERODE (Dt).



General Manager

Internal Guide

# SAKTHI GEAR PRODUCTS



## INTERNSHIP CERTIFICATE

### TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr .SIRANJEEVI. G,** IV Year student B.E.Automobile Engineering, J.K.K.Munirajah College of Technology, T.N.Palayam has successfully completed 45 days (28.03.2023 to 11.05.2023 ) internship in “ **SAKTHI GEAR PRODUCTS PRIVATE LIMITED COIMBATORE.** ”

He has worked on project titled “ **FABRICATION OF REGENERATIVE CLUTCH FOR POWER GENERATION** ”

During this tenure **SIRANJEEVI.G** has involved in his work with dedication. We found him pretty and active in whatever the task we have given him. He is a confident person, punctual, hardworking and inqulsitive.His Conduct and character was good during the internship period.

Coimbatore  
11.05.2023

PRINCIPAL

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GOBI (Tk), ERODE (Dt).



General Manager

Internal Guide

# SAKTHI GEAR PRODUCTS



## INTERNSHIP CERTIFICATE

### TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr .SANJAYKRISHNAN.S** ,IV Year student B.E.Automobile Engineering,J.K.K.Munirajah College of Technology, T.N.Palayam has successfully completed 45 days (28.03.2023 to 11.05.2023 ) **internship** in “ **SAKTHI GEAR PRODUCTS PRIVATE LIMITED COIMBATORE.** ”

He has worked on project titled “ **FABRICATION OF REGENERATIVE CLUTCH FOR POWER GENERATION** ”

During this tenure **SANJAYKRISHNAN.S** has involved in his work with dedication. We found him pretty and active in whatever the task we have given him. He is a confident person, punctual, hardworking and inqulsitive.His Conduct and character was good during the internship period.

Coimbatore  
11.05.2023

PRINCIPAL

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OF TECHNOLOGY  
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GOBI (TK), ERODE (Dt).

General Manager



Internal Guide

# **PROJECT WORK**

**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.



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**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,  
 GUBI (TK), ERODE (Dt).

**OBJECTIVE:**

- To impart knowledge on the structure, properties, treatment, testing and applications of metals and non-metallic materials so as to identify and select suitable materials for various engineering applications.

**UNIT I ALLOYS AND PHASE DIAGRAMS** 9

Constitution of alloys – Solid solutions, substitutional and interstitial – phase diagrams, Isomorphous, eutectic, eutectoid, peritectic, and peritectoid reactions, Iron - carbon equilibrium diagram. Classification of steel and cast Iron microstructure, properties and application.

**UNIT II HEAT TREATMENT** 9

Definition - Full annealing, stress relief, recrystallisation and spheroidising - normalising, hardening and Tempering of steel. Isothermal transformation diagrams - cooling curves superimposed on I.T. diagram CCR - Hardenability, Jominy end quench test - Austempering, martempering - case hardening, carburizing, Nitriding, cyaniding, carbonitriding - Flame and Induction hardening - Vacuum and Plasma hardening. .

**UNIT III FERROUS AND NON-FERROUS METALS** 9

Effect of alloying additions on steel-  $\alpha$  and  $\beta$  stabilisers- stainless and tool steels - HSLA, Maraging steels - Cast Iron - Grey, white, malleable, spheroidal - alloy cast irons, Copper and copper alloys - Brass, Bronze and Cupronickel - Aluminium and Al-Cu - precipitation strengthening treatment - Bearing alloys, Mg-alloys, Ni-based super alloys and Titanium alloys.

**UNIT IV NON-METALLIC MATERIALS** 9

Polymers – types of polymer, commodity and engineering polymers – Properties and applications of various thermosetting and thermoplastic polymers (PP, PS, PVC, PMMA, PET, PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE, Polymers - Urea and Phenol formaldehydes)- Engineering Ceramics - Properties and applications of  $Al_2O_3$ , SiC,  $Si_3N_4$ , PSZ and SIALON -Composites-Classifications- Metal Matrix and FRP - Applications of Composites.

**UNIT V MECHANICAL PROPERTIES AND DEFORMATION MECHANISMS** 9

Mechanisms of plastic deformation, slip and twinning - Types of fracture - Testing of materials under tension, compression and shear loads - Hardness tests (Brinell, Vickers and Rockwell), hardness tests, Impact test Izod and charpy, fatigue and creep failure mechanisms.

**TOTAL: 45 PERIODS****OUTCOMES**

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

- CO1 Explain alloys and phase diagram, Iron-Iron carbide diagram and steel classification.  
 CO2 Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.  
 CO3 Summarize the mechanism of plastic deformation and testing mechanical properties.  
 CO4 Clarify the effect of alloying elements on ferrous and non-ferrous metals.  
 CO5 Differentiate different non-metallc materials.


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**TEXT BOOKS:**

1. Avner,, S.H., "Introduction to Physical Metallurgy", McGraw Hill Book Company,1997.
2. Williams D Callister, "Material Science and Engineering" Wiley India Pvt Ltd, Revised Indian Edition 2014

**REFERENCES:**

1. Kenneth G.Budinski and Michael K. Budinski, "Engineering Materials", Prentice Hall of India Private Limited, 2010.
2. Raghavan.V, "Materials Science and Engineering", Prentice Hall of India Pvt. Ltd., 2015.
3. U.C.Jindal : Material Science and Metallurgy, "Engineering Materials and Metallurgy", First Edition, Dorling Kindersley, 2012
4. Upadhyay. G.S. and Anish Upadhyay, "Materials Science and Engineering", Viva Books Pvt.Ltd., New Delhi, 2006.

  
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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

  
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GOBI (Tk), ERODE (Dt).

# FABRICATION OF FOUR WHEELS MOTORIZED JACK

## A PROJECT REPORT

Submitted by

AJAY KRISHNA (731219102001)

MOHAN KUMAR. M (731219102301)

RAJ. R (731219102302)

*In partial fulfilment of the award of the degree*

*of*

**BACHELOR OF ENGINEERING**

*in*

**AUTOMOBILE ENGINEERING**

**JKK MUNIRAJAH COLLEGE OF TECHNOLOGY**

**T.N.PALAYAM-638506**



*[Signature]*  
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T.N. PALAYAM (Po)-638 506.  
GOBI (TK), ERODE (Dt).

**ANNA UNIVERSITY: CHENNAI-600 025**

**MAY 2023**

**ANNA UNIVERSITY: CHENNAI-600 025**

**BONAFIDE CERTIFICATE**

Certified that this project report "**FABRICATION OF FOUR WHEELS  
MOTORIZED JACK**" is the bonafide work of

**AJAY KRISHNA** (731219102001)

**MOHAN KUMAR. M** (731219102301)

**RAJ. R** (731219102302)

Who carried out the project work under my supervision

  
SIGNATURE

**Mr. V. MAGESH, M.E.,**  
**HEAD OF THE DEPARTMENT**  
**ASSISTANT PROFESSOR**


Department of Automobile Engineering  
JKK Munirajah College of Technology  
T.N. Palayam-638 506

  
SIGNATURE

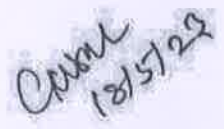
**Mr. V.P. ARULMURUGAN, M.E.,**  
**SUPERVISOR**  
**ASSISTANT PROFESSOR**

Department of Automobile Engineering  
JKK Munirajah College of Technology  
T.N. Palayam-638 506

Submitted for the project examination held on 18/05/2023

  
INTERNAL EXAMINER

  
PRINCIPAL  
JKK MUNIRAJAH COLLEGE  
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GOBI (Tk), ERODE (Dt).


  
EXTERNAL EXAMINER

## ABSTRACT

Weight after certain limits cannot be lifted by a person, in such cases we are in need of jack. When it is motorized it becomes more convenient. In order to implement this idea, we have designed and developed a system called motorized jack operating through toggle switch by having full control of the jack, we can easily lift it up and down by using the speed controller. This helps to reduce the burden of the worker.

The main reason to fabricate the motorized jack is to avoid the fatigue of human during lifting of the load. The project is less cost and good efficient for operating. Our survey regard in several automobile garages, revealed the facts that mostly some difficult methods were adopted in lifting the vehicles for reconditioning.

Now the project has mainly concentrated on this difficulty, and hence a suitable device has been designed. Such that the vehicle can be lifted from the floor land without application of any impact force. The fabrication part of it has been considered with almost ease for its simplicity and economy, such that this can be accommodated as one of the essential tools on automobile garages.

  
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## CHAPTER 8

### CONCLUSION

The screw jack is the best device lift the heavy load. It is necessary that the jack is portable, easy to use, operate by any unskilled worker. It is desirable that it should be stable and can be operated by switch quickly from inside the vehicle by safety point of view

Screw Jacks are the ideal product to push, pull, lift, lower and position loads of anything from a couple of kilograms to hundreds of tons. The need has long existed for an improved portable jack for automotive vehicles.

It is highly desirable that a jack become available that can be operated alternatively from inside the vehicle or from a location of safety off the road on which the vehicle is located.

Such a jack should desirably be light enough and be compact enough so that it can be stored in an automobile trunk, can be lifted up and carried by most adults to its position of use, and yet be capable of lifting a wheel of a 4,000-5,000 pound vehicle off the ground. Further, it should be stable and easily controllable by a switch so that jacking can be done from a position of safety.

It should be easily movable either to a position underneath the axle of the vehicle or some other reinforced support surface designed to be engaged by a jack. Thus, the product has been developed considering all the above requirements. This particular design of the motorized screw jack will prove to be beneficial in lifting and lowering of loads.

  
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# **INTERNSHIP**

**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

  
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## Internship

1 message

SAT 25 MAR 2023 at 3.40pm

From: MAGESHV <hodauto@jkkmct.edu.in>  
Date: SAT 25 MAR 2023 at 3.40pm  
Subject: Internship -reg  
To: sreesaradhambalautomobilespvtltd <skillcenter@ambalauto.com>

Dear Sir,

I am requesting to be joining your **SREE SARADHAMBAL AUTOMOBILES PVT LTD** regarding internship from **1.4.2023 to 15.5.2023**. The requirements are exactly what I have prepared for and hoped to do. I feel confident that I can make a significant contribution to your organization while at the same time learning from your staff.

Refer the following student: **(AJAY KRISHNA, MOHANKUMAR.M, RAJ.R)**

Sincerely,

Head Of The Department,  
J.K.K Munirajah College of Technology,  
T.N.Palayam, Erode-638506, Tamilnadu.

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



---

**Internship**

1 message

---

TUE 28 MAR 2023 at 3.00pm

From: sreesaradhambalautomobilespvtltd <skillcenter@ambalauto.com>

Date: TUE 28 MAR 2023 at 3.00pm

Subject: Internship-reg

To: MAGESHV <hodauto@jkkmct.edu.in>

Dear Sir,

I am pleased to confirm your acceptance of an internship in the Department of Automobile Engineering final year students (AJAY KRISHNA, MOHANKUMAR.M, RAJ.R) with J.K.K Munirajah College of Technology from 1.4.2023 to 15.5.2023 . You must follow company rules and regulation without fail. I expect your full cooperation at that time.

Sincerely,

Skill Centre,  
Sree Saradhambal Automobiles Private Ltd,  
Coimbatore.

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



15.05.2023

**TO WHOMSOEVER IT MAY CONCERN**

This is to certify that **Mr. Ajay krishna (731219102001)** a student of Department of Automobile Engineering, J.K.K. Munirajah College of Technology, has undergone a project work from 01.04.2023 to 15.05.2023 titled on "**FABRICATION OF FOUR WHEELS MOTORIZED JACK**"

We wish him all the best in his future endeavor

Thank You

FOR SREE SARADHAMBAL AUTOMOBILE PVT LTD

*Vasanth*

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

**Sree Saradhambal Automobiles (P) Ltd.,**

Service : Iyer Hospital Premises, Opp. Coimbatore Stock Exchange, Singaallur, Coimbatore - 641 0505

Ph : 0422 - 66499666

\* Saibaba Colony Ph : 0422 - 6649444 \* Ram Nagar Ph : 0422-6640555 \* Sanganoor Ph - 0422-2331646 \* Saravanapatty Ph - 0422-6649777  
\* Villankuruchi Ph - 0422-6649888 \* Sathyamangalam Ph : 9282591010 \* Gobichettipalaym Ph : 9282592020 \* Dharapuram Ph : 9282597070  
\* Erode Ph : 0424 -6649666 \* Bhavani Ph : 92825 96060 \* Namakkal (Pon Nagar) Ph : 9282594040 \* Namakkal Ph : 04256 -64966  
\* Tiruchengodu Ph : 9282595050 \* Rasipuram Ph : 9282593030 \* Coonoor Ph : 0423 - 2202244 \* Ooty Ph : 0423 - 6649666

GSTIN : 33AADC53393J3Z5 TIN No. : 3365 1822364 CST No. : 291 325 dt. 12 - 06 - 98



15.05.2023

**TO WHOMSOEVER IT MAY CONCERN**

This is to certify that **Mr.Mohan kumar.M(731219102301)** a student of Department of Automobile Engineering, **J.K.K. Munirajah College of Technology**, has undergone a project work from **01.04.2023** to **15.05.2023** titled on "**FABRICATION OF FOUR WHEELS MOTORIZED JACK**"

We wish him all the best in his future endeavor

Thank You

FOR SREE SARADHAMBAL AUTOMOBILE PVT LTD

*Vasanth*

*[Signature]*

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T.N. PALAYAM (Po)-638 506.  
GOBI (TK), ERODE (Dt).

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GSTIN : 33AADC53393J3Z5 TIN No. : 3365 1822364 CST No. : 291 325 dt. 12 - 06 - 98



15.05.2023

**TO WHOMSOEVER IT MAY CONCERN**

This is to certify that **Mr.Raj.R (731219102302)** a student of Department of Automobile Engineering, J.K.K. Munirajah College of Technology, has undergone a project work from 01.04.2023 to 15.05.2023 titled on "**FABRICATION OF FOUR WHEELS MOTORIZED JACK**"

We wish him all the best in his future endeavor

Thank You

FOR SREE SARADHAMBAL AUTOMOBILE PVT LTD

*Vasanth*

*[Signature]*  
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T.N. PALAYAM (Po)-638 506.  
GOBI (TK), ERODE (Dt).

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GSTIN : 33AADCS3393J3Z5 TIN No. : 3365 1822364 CST No. : 291 325 dt. 12 - 06 - 98

# **PROJECT WORK**

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**PROJECT WORK**

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**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.

  
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**OBJECTIVES:**

- To understand the fundamentals of composite material strength and its mechanical behavior
- Understanding the analysis of fiber reinforced Laminate design for different combinations of plies with different orientations of the fiber.
- Thermo-mechanical behavior and study of residual stresses in Laminates during processing.
- Implementation of Classical Laminate Theory (CLT) to study and analysis for residual stresses in an isotropic layered structure such as electronic chips.

**UNIT I INTRODUCTION, LAMINA CONSTITUTIVE EQUATIONS & MANUFACTURING 9**

Definition -Need - General Characteristics, Applications. Fibers - Glass, Carbon, Ceramic and Aramid fibers. Matrices - Polymer, Graphite, Ceramic and Metal Matrices - Characteristics of fibers and matrices. Lamina Constitutive Equations: Lamina Assumptions - Macroscopic Viewpoint. Generalized Hooke's Law. Reduction to Homogeneous Orthotropic Lamina - Isotropic limit case, Orthotropic Stiffness matrix ( $Q_{ij}$ ), Typical Commercial material properties, Rule of Mixtures. Generally Orthotropic Lamina -Transformation Matrix, Transformed Stiffness. Manufacturing: Bag Moulding Compression Moulding - Pultrusion - Filament Winding - Other Manufacturing Processes

**UNIT II FLAT PLATE LAMINATE CONSTITUTE EQUATIONS 9**

Definition of stress and Moment Resultants. Strain Displacement relations. Basic Assumptions of Laminated anisotropic plates. Laminate Constitutive Equations — Coupling Interactions, Balanced Laminates, Symmetric Laminates, Angle Ply Laminates, Cross Ply Laminates. Laminate Structural Moduli. Evaluation of Lamina Properties from Laminate Tests. Quasi-Isotropic Laminates. Determination of Lamina stresses within Laminates.

**UNIT III LAMINA STRENGTH ANALYSIS 9**

Introduction - Maximum Stress and Strain Criteria. Von-Misses Yield criterion for Isotropic Materials. Generalized Hill's Criterion for Anisotropic materials. Tsai-Hill's Failure Criterion for Composites. Tensor Polynomial (Tsai-Wu) Failure criterion. Prediction of laminate Failure

**UNIT IV THERMAL ANALYSIS 9**

Assumption of Constant C.T.E's. Modification of Hooke's Law. Modification of Laminate Constitutive Equations. Orthotropic Lamina C.T.E's. C.T.E's for special Laminate Configurations — Unidirectional, Off-axis, Symmetric Balanced Laminates, Zero C.T.E laminates, Thermally Quasi- Isotropic Laminates

**UNIT V ANALYSIS OF LAMINATED FLAT PLATES 9**

Equilibrium Equations of Motion. Energy Formulations. Static Bending Analysis. Buckling Analysis. Free Vibrations — Natural Frequencies

**TOTAL: 45 PERIODS****OUTCOMES:**

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

- CO1 Summarize the various types of Fibers, Equations and manufacturing methods for Composite materials
- CO2 Derive Flat plate Laminate equations
- CO3 Analyze Lamina strength
- CO4 Analyze the thermal behavior of Composite laminates
- CO5 Analyze Laminate flat plates

  
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**GOBI (Tk), ERODE (Dt).**

**TEXT BOOKS:**

1. Gibson, R.F., "Principles of Composite Material Mechanics", Second Edition, McGraw-Hill, CRC press in progress, 1994, -.
2. Hyer, M.W., "Stress Analysis of Fiber - Reinforced Composite Materials", McGraw Hill, 1998

**REFERENCES:**

1. Agarwal, B.D., and Broutman L.J., "Analysis and Performance of Fiber Composites", John Wiley and Sons, New York, 1990.
2. Halpin, J.C., "Primer on Composite Materials, Analysis", Technomic Publishing Co., 1984.
3. Issac M. Daniel and Ori Ishai, "Engineering Mechanics of Composite Materials", Oxford University Press-2006, First Indian Edition - 2007
4. Mallick, P.K., Fiber, "Reinforced Composites: Materials, Manufacturing and Design", Manel Dekker Inc, 1993.
5. Mallick, P.K. and Newman, S., (edition), "Composite Materials Technology: Processes and Properties", Hansen Publisher, Munish, 1990.



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GOBI (Tk), ERODE (Dt).

**OBJECTIVE:**

- To impart knowledge on the structure, properties, treatment, testing and applications of metals and non-metallic materials so as to identify and select suitable materials for various engineering applications.

**UNIT I ALLOYS AND PHASE DIAGRAMS 9**

Constitution of alloys – Solid solutions, substitutional and interstitial – phase diagrams, Isomorphous, eutectic, eutectoid, peritectic, and peritectoid reactions, Iron - carbon equilibrium diagram. Classification of steel and cast Iron microstructure, properties and application.

**UNIT II HEAT TREATMENT 9**

Definition - Full annealing, stress relief, recrystallisation and spheroidising - normalising, hardening and Tempering of steel. Isothermal transformation diagrams - cooling curves superimposed on I.T. diagram CCR - Hardenability, Jominy end quench test - Austempering, martempering - case hardening, carburizing, Nitriding, cyaniding, carbonitriding - Flame and Induction hardening - Vacuum and Plasma hardening. .

**UNIT III FERROUS AND NON-FERROUS METALS 9**

Effect of alloying additions on steel-  $\alpha$  and  $\beta$  stabilisers- stainless and tool steels - HSLA, Maraging steels - Cast Iron - Grey, white, malleable, spheroidal - alloy cast irons, Copper and copper alloys - Brass, Bronze and Cupronickel - Aluminium and Al-Cu - precipitation strengthening treatment - Bearing alloys, Mg-alloys, Ni-based super alloys and Titanium alloys.

**UNIT IV NON-METALLIC MATERIALS 9**

Polymers – types of polymer, commodity and engineering polymers – Properties and applications of various thermosetting and thermoplastic polymers (PP, PS, PVC, PMMA, PET, PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE, Polymers - Urea and Phenol formaldehydes)- Engineering Ceramics - Properties and applications of  $Al_2O_3$ , SiC,  $Si_3N_4$ , PSZ and SIALON -Composites-Classifications- Metal Matrix and FRP - Applications of Composites.

**UNIT V MECHANICAL PROPERTIES AND DEFORMATION MECHANISMS 9**

Mechanisms of plastic deformation, slip and twinning - Types of fracture - Testing of materials under tension, compression and shear loads - Hardness tests (Brinell, Vickers and Rockwell), hardness tests, Impact test Izod and charpy, fatigue and creep failure mechanisms.

**TOTAL: 45 PERIODS****OUTCOMES**

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

- CO1 Explain alloys and phase diagram, Iron-Iron carbide diagram and steel classification.  
 CO2 Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.  
 CO3 Summarize the mechanism of plastic deformation and testing mechanical properties.  
 CO4 Clarify the effect of alloying elements on ferrous and non-ferrous metals.  
 CO5 Differentiate different non-metallc materials.



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**TEXT BOOKS:**

1. Avner,, S.H., "Introduction to Physical Metallurgy", McGraw Hill Book Company,1997.
2. Williams D Callister, "Material Science and Engineering" Wiley India Pvt Ltd, Revised Indian Edition 2014

**REFERENCES:**

1. Kenneth G.Budinski and Michael K. Budinski, "Engineering Materials", Prentice Hall of India Private Limited, 2010.
2. Raghavan.V, "Materials Science and Engineering", Prentice Hall of India Pvt. Ltd., 2015.
3. U.C.Jindal : Material Science and Metallurgy, "Engineering Materials and Metallurgy", First Edition, Dorling Kindersley, 2012
4. Upadhyay. G.S. and Anish Upadhyay, "Materials Science and Engineering", Viva Books Pvt.Ltd., New Delhi, 2006.

  
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**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 – CO<sub>2</sub> 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. 16<sup>th</sup> Edition, 2001.
- Roy. A. Linberg, "Process and Materials of Manufacture", PHI, 2000
- SeropeKalpajian, Steven R.Schmid, "Manufacturing Processes for Engineering Materials", Fourth Edition, Pearson Education, Inc. 2007.

**FABRICATION OF NATURAL COMPOSITE  
MATERIAL (ARECA LEAF)**

**A PROJECT REPORT**

*Submitted by*

**ARAVINTH. R (731219102002)**

**DHINESH KUMAR. K (731219102003)**

**UMA MAHESWARAN. D (731219102008)**

*in partial fulfilment of the award of the degree*

*Of*

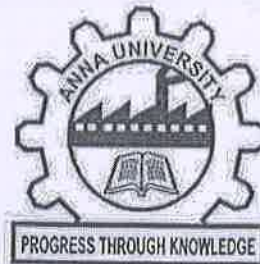
**BACHELOR OF ENGINEERING**

*in*

**AUTOMOBILE ENGINEERING**

**JKK MUNIRAJAH COLLEGE OF TECHNOLOGY**

**T.N.PALAYAM-638506**



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**ANNA UNIVERSITY: CHENNAI-600 025**

**MAY 2023**

ANNA UNIVERSITY: CHENNAI-600 025

**BONAFIDE CERTIFICATE**

Certified that this project report "FABRICATION OF NATURAL COMPOSITE MATERIAL (ARECA LEAF)" is the bonafide work of

**ARAVINTH. R** (731219102002)

**DHINESH KUMAR. K** (731219102003)

**UMA MAHESWARAN. D** (731219102008)

Who carried out the project work under my supervision

  
SIGNATURE

Mr. V. MAGESH, M.E,  
HEAD OF THE DEPARTMENT  
ASSISTANT PROFESSOR


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JKK Munirajah College of Technology  
T.N.Palayam-638506


  
SIGNATURE

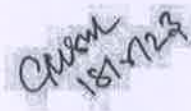
Mr. V. MAGESH, M.E,  
SUPERVISOR  
ASSISTANT PROFESSOR

Department of Automobile Engineering  
JKK Munirajah College of Technology  
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Submitted for the project examination held on 18.5.2023

  
INTERNAL EXAMINER

  
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EXTERNAL EXAMINER

## ABSTRACT

The fabrication of natural composite material using areca leaf and E-glass fiber is a novel approach to create a sustainable and eco-friendly material for various applications. Areca leaf is a natural by product of the areca nut industry and is abundantly available in tropical regions. E-glass fiber is a widely used synthetic fiber that is known for its high strength and durability.

The fabrication process involves first preparing the areca leaf fibbers by washing, drying, and cutting them to a specific length. The E-glass fibbers are also cut to the same length. The two fibers are then mixed in a predetermined ratio and aligned in a specific orientation to create a homogenous mixture. This mixture is then impregnated with a resin matrix, usually made of a bio-based resin, to create a composite material.

The resulting composite material exhibits excellent mechanical properties, such as high strength and stiffness, and is also lightweight and biodegradable. It has potential applications in various industries, such as automotive, aerospace, and construction, where sustainable and eco-friendly materials are highly sought after.

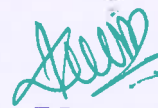
  
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## CHAPTER 9

### CONCLUSION

It has been demonstrated that areca plate can be used to reinforce epoxy resin as the resulting composite has been found to have very attractive physical and mechanical properties. As renewable materials, they can be used to replace or extend non-renewable materials such as those based on petroleum and as a result, the material promises application for/ of many areas. More than enough agricultural fibre residues are available to support composite manufacturing needs, although the agro-based materials may not have a suitable geographical distribution to provide an economically feasible endeavor. The natural material can be used in dustbin manufacturing, solar panel and other industries

The Fibre reinforced composite material - Solar cell loading cassette, Laboratory, school/college writing board, star hostels waste food, Agri Forms, and packing, can be utilized in rural and urban area, industries and E-Conveyances have been developed for better understanding. Waste material recycled and using industry application and benefits of the forest and water, animals, Birds, Human.



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