



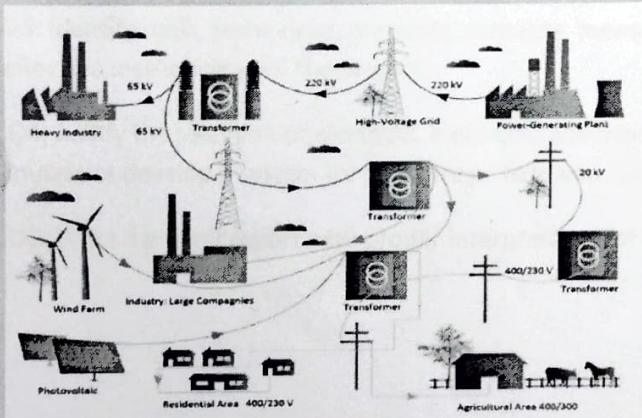
P.E.Society's
MODERN COLLEGE OF ENGINEERING

Shivajinagar, Pune-5.
Department of Electrical Engineering

P.E.S.'s

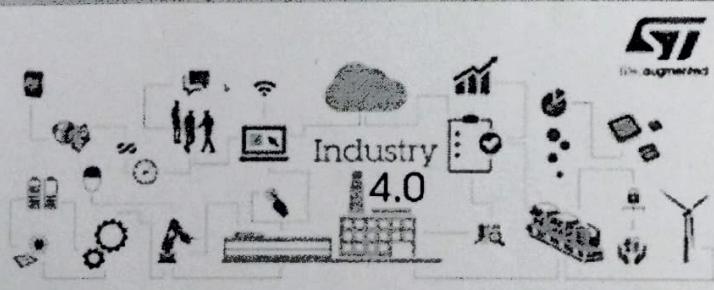
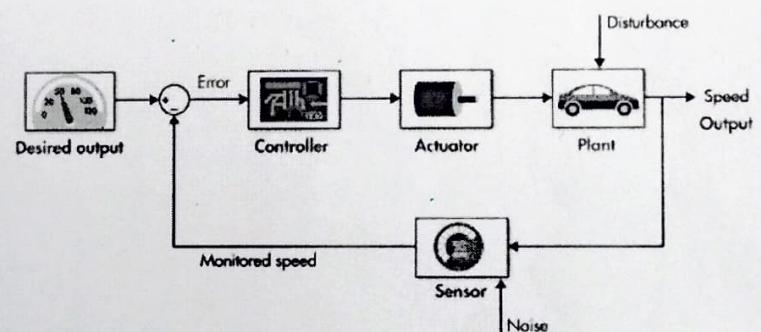
Moden College of Engineering
Department of Electrical Engineering

Project Booklet

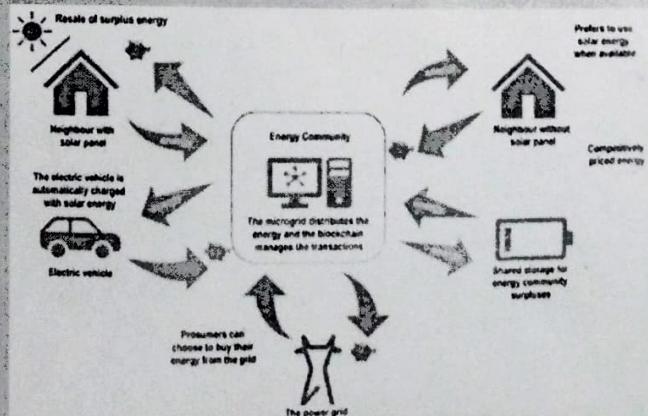


Power System

Control System



Industrial Drives and Automations



Energy Audit and Renewable Energy Sources



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Course outcomes

At the end of this course, students should be able to:

CO1: Define the project problem statement and identify the scope of the project.

CO2: Search the appropriate research papers, standards and e-resources and write a literature survey.

CO3: Identify tools, techniques, methods, concepts, measuring devices, and instruments required for the project to define the methodology of the project.

CO4: Justify the selection of electrical, electronic and mechanical components for the project prototyping
CO5: Simulate or develop a system for software or hardware verification.

CO6: Write a project report with proper interpretation of results.



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Project Stage: 1 Guidelines

Guidelines:

Term work evaluation guidelines are given below.

Sr. No.	Activity	Deadline (Semester I)	Parameters for Evaluation
1.	Topic Approval Presentations	Up to 3 rd Week	<ul style="list-style-type: none">• Problem definition clearly stated (YES/NO)• Objectives clearly defined (YES/NO)• The overall project idea is feasible (YES/NO)
2.	Progress Review-1 Presentation	Up to 8 th Week	<ul style="list-style-type: none">• Problem Definition (5)• Scope & Objectives (10)• Literature Review (10)• Methodology (10)• Block Diagram / Architecture (10)• <u>Project Planning (5)</u>• Total Marks (50)
3.	Progress Review-2 Presentation	Up to 12 th Week	<ul style="list-style-type: none">• Requirement Specification (10)• Literature Review (revised) (5)• Detailed Design (10)• Experimental Setup/Simulation (10)• Performance Parameters (10)• <u>Partial Conclusion (5)</u>• Total Marks (50)
4.	Submission of Project Stage -I Report	Up to 14 th Week	<ul style="list-style-type: none">• Timely submission (5)• Formatting and Report Writing Style (5)• Abstract, Literature Survey, Conclusion (5)• Refereed References (5)• <u>Grammatical correctness in the report (5)</u>• Total Marks (25)

**(Review 1+ Review 2) conversion to 25 marks
+Report (25 marks) = 50 Marks**



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

BE Electrical: A/B (Academic Year 2022-2023)

Sr. No.	Details	Last date of submission	Sign of guide with date	Sign of Coordinator	Sign of H.O.D.
1	Group Details & Domain finalization	15/06/22	W.L 15/6		
2	Discussions and progress reports	29/06/22	W.L 29/6		
3	Title finalization	01/07/22	W.L 1/7/22		
4	Submission of Abstract	08/08/22	W.L 8/8		
5	Block diagram finalization	08/08/22	W.L 8/8		BB
6	Simulation work if software based project	10/10/22	W.L 10/10/22		
7	Component selection if hardware based project	28/09/22	W.L 28/9/22		
8	Assembling/ Simulation results	10/10/22	W.L 10/10/22		
9	Testing	-			
10	Partial report writing	15/10/22	W.L 15/10/22		
11	PPT (mock) for project stage -I	01/11/22	W.L 1/11/22		
12	Project Exhibition/Competition	29/11/23	W.L 29/11/23		MM
13	Paper Presentation	29/11/23	W.L 29/11/23		
14	Final Submission as Per Checklist	02/12/23	W.L 2/12/23		



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Date: 01/12/22

PROJECT GROUP & DOMAIN FINALIZATION

BE Electrical: A/B Academic Year:

Project Domain: Power System/ Control System/Renewable Energy/ Energy Audit/Electrical Machines/Automation/
Industrial Drives

Project Type: Sponsored/In House/Interdisciplinary/Need Based/ Research Potential

Name of students:

Sr. No.	Name of Student	Roll No	Email-id	Contact No	Signature
1	Vaishnavi Jitendra Chinnade	44006	Vaishnavi.chinnade@moderncoe.edu.in	9307895113	Chinnade
2	Sohan Sanjay Dalvi	44008	Sohan.dalvi@moderncoe.edu.in	9834204996	Dalvi
3	Sanket Sanjay Mahajan	44047	Sanket.mahajan@moderncoe.edu.in	9890532232	Mahajan
4	Ojesh Vijay Kumar Patil	44058	Ojesh.patil@moderncoe.edu.in	8806291392	Patil

Prof. Dr.(Mrs.) N.R. Kulkarni
H.O.D. Electrical Dept.

Project Coordinator



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

PROJECT TITLE

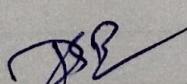
BE Electrical: A/B Academic Year :2022-2023

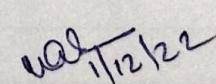
Project Title:

.....Study....and....analysis....of....shape....of....electrode....implemented....in....
.....Super....Capacitor....with....focus....on....design....and....fabrication....for....application....
.....in....load....
.....

Students Name & Sign :

Sr.No.	Name of Student	Roll No	Exam No.	Signature
1	Vaishnavi Jitendra Chinnade	44006	B190812525	<u>Chinnade</u>
2	Sohan Sanjay Dalvi	44008	B190312527	<u>Sohan</u>
3	Sanket Sanjay Mahajan	44047	B190312587	<u>Sanket</u>
4	Ojesh Vijaykumar Patil	44058	B190312617	<u>Ojesh</u>


Project Coordinator


Signature of Guide



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Abstract

Title:

Study and analysis of shape of electrode implemented in super capacitor with focus on design and fabrication for application in load.

Abstract:

SuperCapacitors are used in applications requiring many rapid charge/discharge cycles, rather than long-term compact energy storage - in automobiles, buses, trains, cranes and elevators, where they are used for regenerative braking, short-term energy storage, or burst-mode power delivery. Smaller units are used as power backup for static random access memory (SRAM).

Electrostatic double layer capacitors (EDLCs) use carbon electrodes or derivatives with much higher electrostatic double-layer capacitance than electrochemical pseudocapacitance, achieving separation of charge in a Helmholtz double layer at the interface between surface of conductive electrode & electrolyte.

Date: 01/12/22

Vaishnavi chinnadka chinnadka
Sohan Dalvi sohan dalvi
Sancket Mahajan sancket
Qfesh Patil Qfesh
(Students Name & Signature)



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Literature Survey

Title of reference paper 1:

Effect of electrode shape on the parameters of Super Capacitor

Observation:

Circular, strip and rectangular shaped electrodes can have more application where high power density is required. Fabrication of Supercapacitor is done by using a combination of materials like activated carbon, metal oxide, Separator & electrolyte.

Activated carbon and metal oxide are collectively known as electrode materials and are applied on the electrode materials (i.e) base in form of paste.

One of the method to increase the flexibility of Supercapacitor is to change the shape of electrode as per the needs of application. It was found that the parameters of Supercapacitor are affected when the shape of electrode is changed.

Supercapacitor can be fabricated into flexible forms which are essential for the development of flexible and wearable electronics.



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Title of reference paper 2:

Flexible Solid-state fibre-shaped Super Capacitors based on Organic-inorganic hybrid electrodes for wearable energy storage.

Observation:

The as-prepared FSC (Fibre shaped Capacitors) device revealed excellent performance such as high volumetric capacitance, good rate capability and excellent mechanical stability in both electrochemical test and binding test.

A high performance and flexible fibre shaped Supercapacitor (FSC) with organic-inorganic hybrid structure was fabricated. The results demonstrate the proposed FSC has great potential as an efficient energy storage device for wearable electronics.



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Title of reference paper 3:

Sustainable materials for solid flexible Supercapacitors

Observation:

Solid, thin and flexible Supercapacitors have been investigated leveraging sustainable & low-cost biomass-based carbon electrodes and a series of solid polymer electrolytes. The performance of these solid flexible devices was systematically compared to commercial activated carbon and liquid electrolyte baseline.
This demonstrates that high surface area, porous activated carbon networks can still be readily accessible to polymer electrolytes, which is important to the transition of Supercapacitor devices from liquid to solid state.

These materials and systems represent simple, sustainable and cost-effective approaches for next-generation solid thin, flexible energy storage devices



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Title of reference paper 4:

Modelling and Simulation of effect of double layer Capacitance on PEM fuel cell performance.

Observation:

Fuel cell technology is one of the most promising, emission free, environment friendly energy conversion technology popularly used for various commercial applications like electrical vehicles, building cogeneration and standby power supply.

Power density and efficiency of PEM fuel cell depends on its terminal voltage in term is a function of activation polarization and depends on the double layer capacitance formed between electrodes and electrolytes.

In this paper MATLAB Simulink model of PEM fuel cell is presented to investigate effect of double layer capacitance on performance of PEM fuel cell.



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Final Title of Project : Study and analysis of shape of electrode implemented in Super capacitor with focus on design and fabrication for application in load.

Suggestions from Internal/External Examiner:

- 1) To modify /rename title of project
- 2) To create a small model of project.
- 3) To do simulation of different Shape of electrode of Supercapacitor to compare software & practical performance.

External Committee Members

Project Guide

Project Coordinator



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Progress report no. 1

Date: 01/07/22

Topic discussed with Guide:

We discussed about the project that should be on which basis? We took a brief idea from our guide about finalizing the project. We also discussed that how our project will be different from others.

Suggestions given by Guide:

Our guide suggested that the project domain should be based on renewable energy and project type must be research potential. Mam suggested to select project based on storage system.

Student's Sign Girinade / Smita

u/s
Signature of Guide

Progress report no. 2

Date: 13/07/22

Topic discussed with Guide:

We selected some topics and discussed it with mam based on storage system so mam suggested us to select supercapacitor as project.

Suggestions given by Guide:

Mam told us to refer atleast some 4 research papers of recent years and study and analyze these papers.

Student's Sign Girinade / Smita

u/s
Signature of Guide



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Progress report no. 3

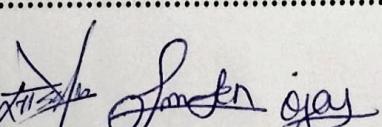
Date: 08/08/22

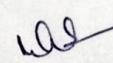
Topic discussed with Guide:

We selected some research papers and we studied those research paper based on SuperCapacitor in order to get some information regarding supercapacitor.

Suggestions given by Guide:

Mam told us to refer the research papers related to types of SuperCapacitors, Shape and material of electrode.

Student's Sign Girimade 

Signature of Guide 

Progress report no. 4

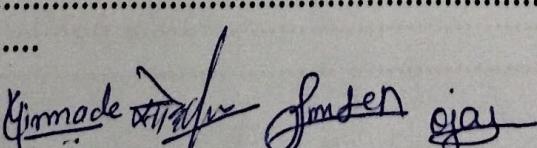
Date: 05/09/22

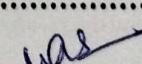
Topic discussed with Guide:

From selected research paper we made the difference of parameters of SuperCapacitor and we are going to make Electrolyte Double Layer SuperCapacitor.

Suggestions given by Guide:

Mam suggested us to visit manufacturing company of battery to gather more information about construction, working and the materials used.

Student's Sign Girimade 

Signature of Guide 



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Progress report no. 5.

Date: 27/09/22

Topic discussed with Guide:

As per suggestion of our guide we visited manufacturing company of battery (i.e.) We get to know more information that was required in our project.

Suggestions given by Guide:

Man discussed & suggested us to prepare software model of different shapes of supercapacitor using Comsol software.

Comsol Multiphysics.

Student's Sign Kirandeep Singh Panesar

Signature of Guide W.L

Progress report no. 6.

Date: 10/10/22

Topic discussed with Guide:

We implemented 3 types of supercapacitor using software Comsol Multiphysics.

Suggestions given by Guide:

Man suggested us to make report and insert the figures of types of Supercapacitor that we have implemented in Comsol Multiphysics.

Student's Sign Kirandeep Singh Panesar

Signature of Guide W.L



P.E.Society's
MODERN COLLEGE OF ENGINEERING
 Shivajinagar, Pune-5.
 Department of Electrical Engineering

403152: Project Stage II

Teaching Scheme			Credits		Examination Scheme	
SEM/P WIN	12	Hrs./Week	SEM/PW/IN	6	ORAL	50
					Termwork	100

Guidelines:

Termwork evaluation guidelines are given below:

Sr. No.	Activity	Deadline (Semester II)	Parameters for Evaluation
1	Progress Review- 3 Presentation	Up to 6 th Week	Revised Final Design (10) Tools and Techniques Used with justification (10) Partial Implementation/ development (15) Partial Results (15)

BE Electrical (2019 Course)

73

			Total Marks (50)
2	Progress Review- 4 Presentation	Up to 12 th Week	Implementation Status of project (10) Testing and Evaluation (10) Intermediate Results (15) Conclusion (10) Future Scope (5) <u>Total Marks (50)</u>
3	Submission of Project Stage -II Report	Up to 14 th Week	Timely submission (5) Formatting and Report Writing Style (5) Abstract, Literature Survey, Conclusion (10) Grammatical correctness in the report (5) Publication/participation in project exhibition (20) <u>Total Marks (50)</u> Review 3+ Review 4+ Final Project Report = 150 Rounded to 100 Marks



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Date: 3/2/23

Progress report no. 1

Topic discussed with Guide:

We...designed...Super Capacitor...adding...proper dimension & decided...
to make electrodes...of...various...shapes.....

Suggestions given by Guide:

...Mam suggested us to make electrodes of Square, Rectangle,
Circular, semi-Circular, triangle shapes.....

Student's Sign Nimade

Signature of Guide W.E.

Progress report no. 2

Date: 6/2/23

Topic discussed with Guide:

We...decided to make electrodes of Square, rectangular, circular,
semi-circular, triangle shapes with proper dimension given by
guide.....

Suggestions given by Guide:

Student's Sign Nimade

Signature of Guide W.E.

Progress report no. 3

Date: 10/2/23



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Topic discussed with Guide:

Firstly..we..decided..to..make..electrode..of..rectangular..shape..by...
Cutting..still..gauge..for..making..a..paste..of..MnO₂..+..Carbon.....

Suggestions given by Guide:

Mam..Suggested.us..to..make..more..3-4..super.capacitor..of..
rectangular..shape.....

Student's Sign Kinnarade Sabyasachi Dey

W.L
Signature of Guide

Progress report no. 4.

Date: 10/12/23

Topic discussed with Guide:

Then..we..decided..to..make..electrode..of..triangular..,circular..+..
Semi-circular..shape..using..same..procedure.....

Suggestions given by Guide:

Mam..Suggested.us..to..measure..total..Capacitance..of..
all..Shapes.....

Student's Sign Kinnarade Sabyasachi Dey

W.L
Signature of Guide

Progress report no. 5

Date: 20/12/23



P.E. Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Topic discussed with Guide:

We made solution of $K_2S_0_4$ + distilled water in which super capacitor was dipped for 5-10 minutes to gain capability of energy storage.

Suggestions given by Guide:

Man suggested us to charge & discharge capacitors by using A.C Supply & Discharging circuit.

Student's Sign Ganesh Sankar

Progress report no. 6

Topic discussed with Guide:

By using charging / Discharging circuit we charged supercapacitor for 2 min by giving 2 volt A.C Supply & discharged it with highest rate to time.

Signature of Guide Mr. ...

Date: 6/3/23

Suggestions given by Guide:

Student's Sign Ganesh Sankar

Progress report no. 7

Signature of Guide Mr. ...

Date: 20/3/23



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Topic discussed with Guide:

The same process of charging & discharging of Supercapacitor was applied to all shapes of supercapacitors & took the voltage discharging readings with respect to time.

Suggestions given by Guide:

Mam suggested us to plot graph, do calculations with the help of readings.

Student's Sign Gomade Shilpa

Signature of Guide W.L

Progress report no. 8

Date: 3/4/23

Topic discussed with Guide:

We plotted graph of all shapes of Supercapacitor having discharging voltage with respect to time.

Suggestions given by Guide:

Student's Sign Gomade Shilpa

Signature of Guide W.L

Progress report no. 9

Date: 10/4/23



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Topic discussed with Guide:

With the help of calculations we measured the capacitance's of various shape of electrodes & obtained energy storage capabilities.

Suggestions given by Guide:

Mam suggested us to conclude that which shape has high capacitance & low discharging rate.

Student's Sign Ginnade Sanket godse

ws
Signature of Guide

Progress report no. 10.

Date: 17/4/23

Topic discussed with Guide:

We concluded that rectangular shape has highest capacitance amongst various shapes & also low discharging rate.

Suggestions given by Guide:

Mam suggested us to prepare research paper & try to publish.

Student's Sign Ginnade Sanket godse

ws
Signature of Guide

Progress report no. 11

Date: 20/4/23



P.E.Society's
MODERN COLLEGE OF ENGINEERING
Shivajinagar, Pune-5.
Department of Electrical Engineering

Topic discussed with Guide:

We prepared Research paper & published on ("International Journal of Engineering & Management Research")

Suggestions given by Guide:

Student's Sign Kinnar Singh Gehlot

W.S.
Signature of Guide

Progress report no. 12

Date:

Topic discussed with Guide:

Suggestions given by Guide:

Student's Sign

Signature of Guide