

**GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)****Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021)**  
Semester-V**Course Title: Electrical Engineering Project-I**  
(Course Code: 4350904)

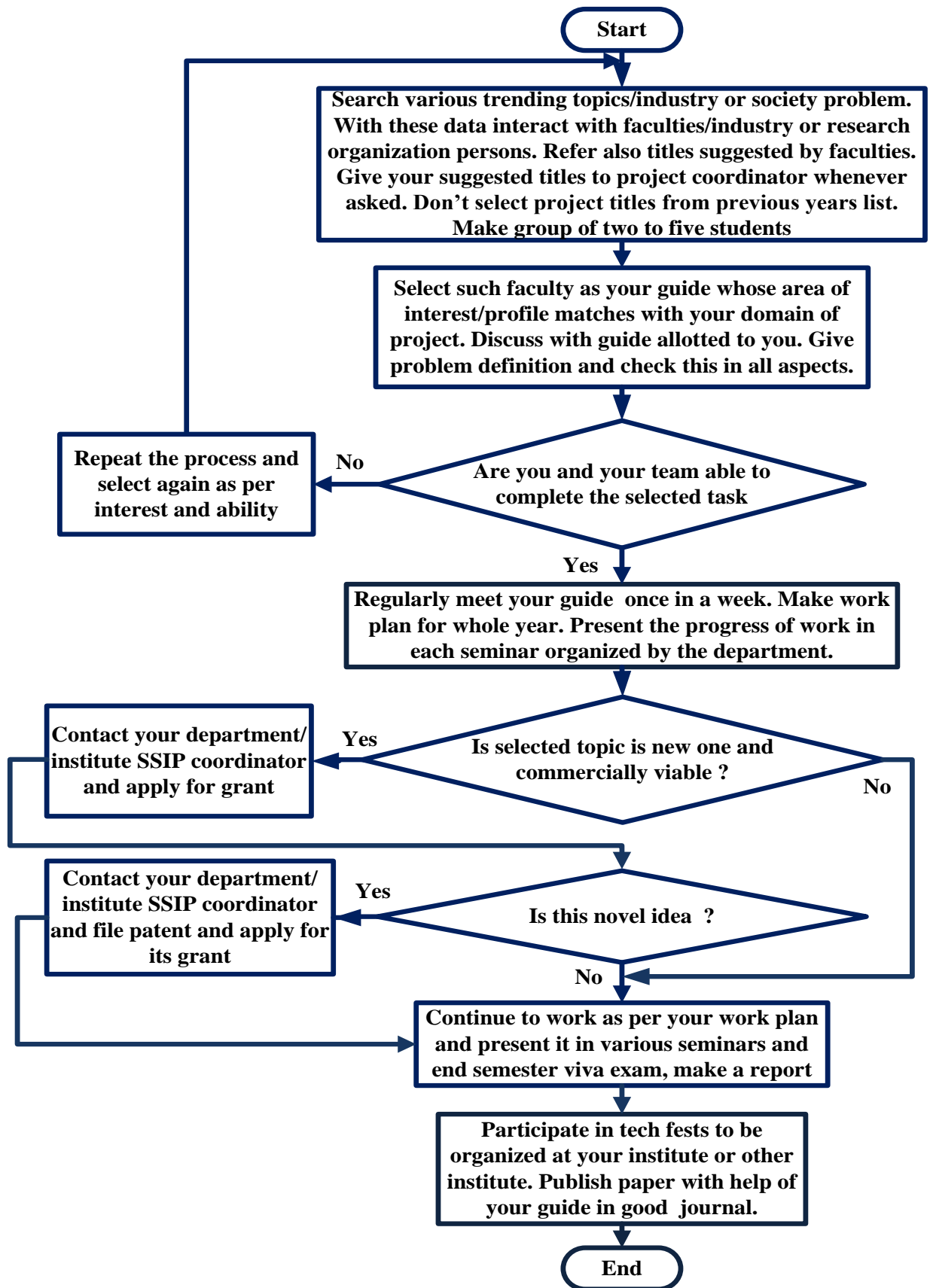
Diploma programme in which this course is offered	Semester in which offered
Electrical Engineering	5 <sup>th</sup> Semester

**1. RATIONALE**

The course "Electrical Engineering Project-I" is designed with the aim that students will be able to keep pace with future changes in technology and the acquisition of knowledge and skills as and when needed. This course is designed to provide students with a virtual industrial experience. This course includes identifying the problem, different methods of solution, selection of an appropriate method, selection of appropriate equipment and components, selection of appropriate guide and making the work plan to complete the whole work within time limit. Four seminars are included in this course to develop communication skills in students as well as to assess the progress of the work done.

**Project identification and guide allocation:**

- First of all students have to form a group and select some proposed project titles based on their interest. To select proposed titles students have to visit various websites, visit industries, refer journals and books and meet and discuss with faculties.
- Faculty from a department whose work area/ area of interest seems to fit with the student's selected topic may be considered as the best guide for that particular group.
- Before the start of the fifth semester, project orientation should be held every year by the project coordinator. In this orientation, discussion regarding the selection of a topic, the formation of a team, and the selection of a guide should take place.
- A guide list with their expertise domain and area of interest should also be given to students.
- This list should also be uploaded to the departmental/institutional website.
- Students should also be given the choice to choose a guide whose area of interest matches with their project domain. The project title selection process and other related tasks are summarized in the following flow chart.



### **During 5<sup>th</sup> semester, students should have to follow these steps for project related work:**

- 1) Interact with the institute guide/ industry/research organization personnel
- 2) Select focused project title.
- 3) Gather information and organize it in well manner-literature Survey.
- 4) Define, explain and submit problem definition.
- 5) Seek guidance from the guide and update him/her about your progress regularly.
- 6) Conceive and draw General block diagram of selected project.
- 7) Develop circuit diagram in detail.
- 8) Write algorithm and draw flowchart (particularly if project work is based on Microprocessor/Microcontroller).
- 9) Simulate circuit (if required).
- 10) Prepare project report (as per format given by department/available on departmental website)
- 11) Prepare PPT for presentation (**for various seminars and final presentation at the end of the semester conducted for progressive assessment**)

## **2. COMPETENCY**

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency

- 1 To develop inquisitiveness, innovative skills, and confidence to work independently.
2. To participate effectively in group work.
3. To collect relevant data.
4. To plan and organize the work.
5. To analyze and synthesize the data.
6. To relate knowledge of various courses in a selected problem.
7. To make an appropriate decision whenever it is required.
8. To conduct a survey and investigation.
9. To solve industry problems.
10. To optimize the cost of the project.
11. To design the layout as per requirement.
12. To prepare block diagram, circuit diagram, simulation model and microcontroller program as per requirements.
13. To assess the financial implication and feasibility of the project.
14. To prepare the technical reports and ppt.

### 3. COURSE OUTCOMES (COs)

Students will be able to

- CO.1** Review the existing literature/system to find possible problem in existing system.
- CO.2** Select the best suitable solution to solve the defined problem along with budget.
- CO.3** Design methodology to reach final solution.
- CO.4** Initiate to assemble project after purchasing the component.
- CO.5** Defend progress review for 5<sup>th</sup> semester with report writing, presentation and work done till date as individual and team.

### 4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P/2)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
			C	CA	ESE	CA	ESE	
0	0	2	1	0	0	50	50	100

**Legends:** *L*-Lecture; *T* – Tutorial/Teacher Guided Theory Practice; *P* - Practical; *C* – Credit, *CA* - Continuous Assessment; *ESE* - End Semester Examination.

### 5. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

This major equipment with broad specifications is a guide to procure them by the administrators to use in the laboratory dedicatedly made for the project work.

Sr.No.	Equipment Name with Broad Specifications
1	Dual channel D.C. supply, 0-30 Volt, 2 Amp with display
2	<b>Tool kits</b> that include spanners, screw drivers of various size, soldering iron, measuring tape, drilling machine, tester, multi meter, clip on meter, hammer, hack saw, flux, pliers, nose pliers, insulation tape etc.
3	Dual channel Digital Storage Oscilloscope
4	10 MHz function generator
5	Miscellaneous components like Diode, Transistor, Step down Transformers, LED, Relay, various analog digital and microcontroller ICs as per requirement.

Sr.No.	Equipment Name with Broad Specifications
6	Lamp load 3-phase 415 V, 0-10 A.
7	Single-phase, Three-phase supply panels with suitable measuring instruments.
8	Microcontroller Programming Software/ Integrated Digital Environment as per requirement
9	Simulation software like MATLAB, PSIM, Proteus etc. as per requirement
10	At least 2 PCs having latest specifications
11	LCD/LED projector to be used for presentation in seminars

## 6. AFFECTIVE DOMAIN OUTCOMES

The following **sample** Affective Domain Outcomes (ADOs) are embedded in many of the above-mentioned COs. More could be added to fulfill the development of this course competency.

- Work as a leader/a team member (while doing a project work).
- Follow safety practices while using D.C. and AC supply and electrical equipment.
- Work as a group member (while testing the project)
- Practice environmentally friendly methods and processes. (Environment related)

The ADOs are best developed through the laboratory/field-based exercises. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

- 'Valuing Level' in 1<sup>st</sup> year
- 'Organization Level' in 2<sup>nd</sup> year.
- 'Characterization Level' in 3<sup>rd</sup> year.

## 7. UNDERPINNING THEORY

The major underpinning theory is given below based on the higher level UOs of *Revised Bloom's taxonomy* that are formulated for development of the COs and competency. If required, more such UOs could be included by the course teacher to focus on attainment of COs and competency. **(Overall work of Project-I should be done in following steps)**

Unit	Unit Outcomes (UOs)	Topics and sub topics
Unit-I Review the existing	1a. Carry out literature survey and industrial visits. 1b. Identify the problems in the area related	1.1 To select the appropriate project title, survey different types of research papers, books and websites. Do

literature/system	<p>to the Electrical Engineering.</p> <p>1c. Identify the information/data required related to selected problem.</p> <p>1d. Make problem statement and abstract for selected problem/work.</p>	<p>industry visits if necessary.</p> <p>1.2 Identify the problem related to the Electrical Engineering.</p> <p>1.3 Identify and gather the information related to the selected problem.</p> <p>1.4 From the gathered information (and with the help of guide) make appropriate problem statement and abstract.</p>
<p><b>Unit-II</b></p> <p>Select the best suitable solution</p>	<p>2a. Collect relevant data from different sources (books/internet/market/suppliers/experts etc.)</p> <p>2b. Analyze the collected data and generate useful information from it.</p> <p>2c. Present generated information visually in form of appropriate chart/graphs.</p> <p>2d. Derive different possible solutions creatively.</p> <p>2e. Attempt alternative solutions/revise aims and execute alternative plan in case of failures.</p>	<p>2.1 For the solution of selected problem collect relevant data from the various sources.</p> <p>2.2 Analyze the collected data for the solution of selected problem.</p> <p>2.3 If require make chart/graph/simulation to select relevant method.</p> <p>2.4 Compare various methods for the solution of selected problem.</p> <p>2.5 If selected solution does not work (after suggestion given by guide/industry mentor) select alternate method.</p> <p>2.6 Assess the financial implication and feasibility of different solutions based on preliminary studies.</p>
<p><b>Unit-III</b></p> <p>Design methodology to reach final solution.</p>	<p>3a. Prepare project proposals before starting the project work.</p> <p>3b. Prepare required drawings and detailed plan for execution of the work.</p>	<p>3.1 Analyze and compare different possible methods for solution of the selected problem considering financial implication.</p> <p>3.2 Select relevant machine/equipment/instrument/software for the solution of selected problem.</p> <p>3.3 Consider safety first while selecting the way to work.</p> <p>3.4 For all above steps take help continuously from institute guide/industry mentor or other relevant person.</p> <p>3.5 Prepare work plan of the project.</p>

<p><b>Unit-IV</b> Initiate to assemble project after purchasing the component.</p>	<p>4a. Optimize the cost of components/material 4b. Incorporate safety measures in work.</p>	<p>4.1 Select components and equipments with required specification 4.2 Prepare cost schedule of the project. 4.3 All the students of the group should distribute the work according to the skill of each student. 4.4 Work persistently to achieve the targets.</p>
<p><b>Unit-V</b> Defend progress review for 5th semester</p>	<p>5a. Participate effectively in group. 5b. Work independently for the individual responsibility undertaken. 5c. Prepare the technical report. 5d. Prepare presentations. 5e. Acknowledge the help rendered by others in the project. 5f. Present findings/features of the projects in seminars.</p>	<p>5.1 After assigning the work, each student should do the work independently to complete the particular task in minimum time. 5.2 Prepare project report as per the format provided by the project coordinator. 5.3 Prepare PPT and present it as per schedule. 5.4 Reflect your viewson experiences gained during project work in report and ppt. 5.5 Students can take help of any person relevant to the topic selected. That person must be acknowledged in the report/presentation. 5.6 Arrange mock presentations in the group before actual presentation. 5.7 Consider suggestions given by guide/evaluation team in previous seminar/meeting while preparing the report/presentation. 5.8 Confidently answer the questions asked during seminars.</p>

**Note:-**Departmental SSIP team may check each project and may decide whether any project is appropriate for SSIP scheme or not. If project is found viable for that, students of that group (with help of departmental SSIP coordinator) have to apply for grant from SSIP or other funding agency.

### 8. (a) Scope of Projects

Scope of the project work should be decided based on following criteria:

- (i) **Relation to diploma programme curriculum:** When student intend to select topics for the project work they need to choose a project which relates well to their curriculum (it may be beyond curriculum but it should relate to it) and requires implementation of theories already learnt and skills already possessed by them from the previous semesters.
- (ii) **Abilities possessed by the group of students:** Projects should be chosen so that it can be completed mainly using students problem solving capabilities and depth of learning. It is natural that highly motivated

students or high achievers may come out with projects which are more complex and challenging. Teachers should guide students to choose challenging projects according to the student's ability.

**(iii) Resources available:** Students and Guides should keep in mind the availability of resources while deciding the topic and the scope of the project. Some of the important resources which need consideration are:

- Time available
- Raw material/components required
- Manufacturing/fabrication equipment and tools required
- Testing/Measuring equipment and instruments required
- Access to journals (library/digital)
- Expertise for theoretical guidance available in college (or nearby Institutions or nearby industries)
- Expertise and Technology required for fabrication (if required)
- Software required

**8 (b) Types of Projects:** In general the projects are of the following types:

- (i) Design projects
- (ii) Prototype (design, make, test and evaluate)
- (iii) Advanced experimental work requiring the development of existing equipment to be need and developed
- (iv) Field works: This could include surveys, using equipment, charting data and information from virtual observation.
- (v) Comparative studies : Theoretical study of two systems/ mechanisms/ processes in detail and comparing them on the basis of cost/ energy conservation/ **impact on environment**/ technology used etc.
- (vi) Application of emerging technology: Theoretical study of some emerging technology and feasibility of its application in some real life situation in detail.
- (vii) Fabrication of some equipment/ machine etc.
- (viii) Development of software/ application to solve some complex problem related to Electrical Engineering field.

## 9. ASSESSMENT OF PROJECT WORK

Project Guide and/or Program coordinator and/or Project evaluation committee will assess the project work in four different project seminars as per the assessment rubrics suggested here. Total four seminars are to be held during the fifth semester and continuous assessment (CA for 50 marks) is to be done as per the following suggested sheet. (Remaining 50 marks are for the end semester exam - ESE which shall be conducted by the GTU). If two independent projects for 5<sup>th</sup> and 6<sup>th</sup> semester are offered, project guide/program coordinator/ project evaluation committee will slightly change the assessment criteria.

### Evaluation of **Electrical Engineering Project-I (4350905)**

Serial No.	Students Name	Enrollment Number	Project Title	Marks (Continuous Assessment)
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			Name of Guide		Seminar-I (out of 10)	Seminar-II (out of 10)	Seminar-III (out of 10)	Final Evaluation (out of 20)	Total (out of 50)
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

Project evaluation committee

Project Coordinator

Head of the Department

***Sample assessment rubrics to be used to verify the progressive work done by the student for different seminars/final evaluation of progressively work done by students.***

**Assessment Rubrics of Electrical Engineering Project-I (4350905)**

Sr. No	Activity	Criteria for performan	High Proficiency	Proficiency	Some Proficiency	No/Limited Proficiency	Score
.							

		ce	8 to 10 Marks	6 to 7 Marks	3 to 5 Marks	0 to 2 Marks	
1	Seminar-1	Literature Survey	Student surveyed all the possible literatures/resources	Student surveyed the possible literatures/resources	Student surveyed less literatures/resources	Student surveyed very less literatures/resources	Marks converted to out of 10
		Problem Identification	Student states the problem clearly and identifies underlying issues	Student adequately defines the problem	Student fails to define the problem adequately	Student does not identify the problem	
2	Seminar-2	Approach to the solution	Innovative approach	Fairly good approach	Simple approach	No approach at all for solution of selected problem	Out of 10
3	Seminar-3	Developing a plan to solve the problem	Student developed a clear and capsized plan to solve the problem, with alternative strategies	Students develops an adequate plan	Student develops a marginal plan	Student does not develop a coherent plan to solve the problem	Out of 10
4	Seminar-4 (Final evaluation at the end of 5th semester)	Interpreting findings and solving the problem and started assembling of project (Required till that time)	Student provides a logical interpretation of the simulation and findings and clearly solves the problem. Made required hardware.	Student provides a logical but incomplete interpretation of the simulations and findings but solves the problem. Made some portion of required hardware.	Student does not provide an interpretation of the simulations and findings but solves the problem. Make very small portion of required hardware.	Student does not interpret the findings/reach the conclusion. Did not start making of hardware.	Marks converted to out of 20
		Presenting the work effectively and confidently	Student explain the work very effectively and confidently	Student explain the work effectively and confidently	Student explain the work less effectively and with lack of confidence	Student not able to explain the work effectively and confidently	
Total							Out of 50

## 10. SOFTWARE/LEARNING WEBSITES

- <https://www.electronicsforu.com/>
- <https://www.electrical4u.com/>
- <https://www.mathworks.com/>
- <https://www.arduino.cc/>
- <https://www.alldatasheet.com/>
- <https://www.allaboutcircuits.com/>
- <https://circuitglobe.com/>
- <https://www.electricaltechnology.org/>
- [www.vlab.co.in](http://www.vlab.co.in)

**11. PO-COMPETENCY-CO MAPPING:**

Semester I	Electrical Engineering Project-I (Course Code: 4350904)						
	POs						
Competency & Course Outcomes	PO 1 Basic & Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / develo pment of solutio n	PO4 Engineering Tools, Experim entation & Testing	PO 5 Engineering practices for society, sustainability & environment	PO 6 Project Managem ent	PO 7 Life-long learning
<b>Competency</b>	<b>Initiate to assemble project as per required design and present the work done till date</b>						
Course Outcomes CO1 Review the existing literature/system to find possible problem in existing system.	2	3	-	-	-	3	3
CO2 Select the best suitable solution to solve the defined problem along with budget.	3	3	2	-	2	-	2
CO3 Design methodology to reach final solution.	3	-	3	-	3	3	3
CO4 Initiate to assemble project after purchasing the component.	1	-	-	3	-	-	3
CO5 Defend progress review for 5 <sup>th</sup> semester with report writing, presentation and work done till date as individual and team.	-	-	-	-	2	3	3

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.

**12. COURSE CURRICULUM DEVELOPMENT COMMITTEE****GTU Resource Persons**

S. No.	Name and Designation	Institute	Contact No.	Email
1.	Dr Hemant I. Joshi Lecturer Electrical Engg.	R C Technical Institute, Ahmedabad	9998579554	<a href="mailto:hemantjoshi0711@gmail.com">hemantjoshi0711@gmail.com</a>

