GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021)
Semester-VI

Electronics and Communication Engineering Project-II

(Course Code: 4361103)

Diploma programmer in which this course is offered	Semester in which offered
Electronics and Communication Engineering	6th

1. **RATIONALE:** The course in fifth semester, "Electronics Engineering Project-I",was designed with the aim to motivate the students to implement innovative electronic solutions that address real-world problems or enhance existing systems. Students were directed to identify solution of the problem of real/ live problems of the Industry/Govt./NGO/ MSME/Rural Sector or work on an innovative idea having the potential of a Startup to help better our eco system. The project aims to leverage the power of electronics to address a specific need or challenge, contributing to technological innovation and societal improvement.

   To achieve solution, brainstorming has to done by group of students for possible alternative designs by preparing flow chart, block diagram, its tentative electronic circuit and related software coding etc. This project work should be desirable comprising of hardware and software both.

   In this sixth semester students have to work for optimum hardware and software implementation of their selected project work in fifth semester.

2. **COMPETENCY:** Student will be able to
   - Test designed electronic circuit for a solution of real life problem by identify the problem and apply innovative, creative and logical approach for problem solving using Knowledge gain in diploma EC engineering.

3. **COURSE OUTCOMES (COs):** Student will be able to

   1. Design PCB for intended electronic circuit.
   2. Fabricate and test PCB for proposed electronic circuit.
   3. Develop /Debug code using appropriate simulation software.
   4. Prepare and present detailed report of project work.
   5. Develop leadership, team work, and interpersonal communication skill.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P/2)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	CA	ESE	CA	ESE	
0	0	2	1	0	0	25	25	50

(*):Out of 50 marks under the theory CA, 15 marks are for assessment of the micro-project to facilitate integration of COs and the remaining 35 marks is given based on performance in laboratory during the

semester for assessing the attainment of the cognitive domain UOs required for the attainment of the COs.

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:

Sr.No.	Equipment Name with Broad Specifications
1	CRO/DSO , 2 Channel
2	Arbitrary Function Generator
3	Spectrum Analyzer
4	Universal Programmer
5	PCB kit
6	Soldering Station and de soldering pump
7	IC tester
8	LCR-Q meter
9	High End Digital Multimeter (3 & ½ Digit)
10	DC Power Supply
11	Field Strength Meter
12	Embedded system Development Boards
13	Desktop PC/laptop/tablet
14	Appropriate free software / simulators

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

a) Work as a leader/a team member.

b) Follow ethical practices.

c) Follow safety precautions.

d) Realize importance of E-waste management.

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:

i. 'Valuing Level' in 1st year,

ii. ' rganization Level' in 2nd year,

iii. 'Characterization Level' in 3rd year.

7. UNDERPINNING THEORY:

Unit	Unit Outcomes (UOs)	Topics and sub topics
1.PCB Design	1a. Place, route and generate the layout of given circuit using manual or auto routing using PCB layout design software. 1b. Preview PCB using Layout Design Files.	1.1 Create a schematic of the chosen circuit & generate net lists from the created schematic. 1.2 Arrange components in a neat manner. Trace each net on appropriate layers and finish routing the board. 1.3 Check for any pending nets using tool. & Perform Design Rule Check (DRC) and Electrical Rule Check (ERC) of your board. Add copper pours, silkscreen, holes for mounting, etc. 1.4 Generate design files (Gerber files)
2.PCB fabrication and Mounting of components	2a. Solder components on PCB. 2b. Follow the PCB fabrication steps.	2.1 Testing of all the components to be used by using DMM/CRO/IC Tester. 2.2 Solder Components on PCB keeping in mind all safety measures. 2.3 Fabricate PCB for the proposed circuit.
3.Coding/Software and hardware Testing	3a. Perform Coding.(if any) 3b. Debugging/Testing fabricated PCB.	3.1 Perform Coding for the proposed circuit using suitable Simulator /Simulator hardware (If any) 3.2 Test/Debug the code in a specific simulator. 3.3 Test / Debug your projects hardware in presence of project guide and verify your required outcome.
4.Documentation /Project Report	4a. Participate effectively in group. 4b. Work independently for the individual responsibility undertaken. 4c. Prepare the technical report. 4d. Prepare presentations. 4e. Present findings/features /Expansion of the projects in seminars.	4.1 Prepare project report as per the format provided by the project guide. 4.2 Prepare PPT covering all work carried out 4.3 Reflect your views on experiences gained during project work in report and ppt. 4.4 Students can take help of any person relevant to the topic selected. That person must be acknowledged in the report/presentation. 4.5 Arrange mock presentations in

		the group before actual presentation. 4.6 Consider suggestions given by guide/evaluation team in previous seminar/meeting while preparing the report/presentation. 4.7 Confidently answer the questions asked during seminars.
5.Soft skills	5a. Leadership Skills 5a.1 Delegation 5a.2 Problem-Solving 5a.3 Communication 5a.4 Recognition	5.1.1 Learn how to delegate tasks effectively by matching them with team members' strengths and skills. 5.1.2 Improve your problem-solving skills and the ability to think creatively when faced with challenges. 5.1.3 Foster open and transparent communication within the team. Regularly share updates and feedback. 5.1.4 Acknowledge and appreciate the contributions of team members to boost morale and motivation.
	5b. Teamwork Skills 5b.1 Collaboration 5b.2 Accountability	5.2.1 Work effectively with others, recognizing the strengths and contributions of each team member. 5.2.2 Hold yourself and your team members accountable for their responsibilities and commitments.
	5c.Presentation skill	5.3.1 Present your project work activity by PPT with good posture and clean pronunciation 5.3.1 Face various questionnaires with confidence which rises while in presentation

8. SUGGESTED STUDENT ACTIVITIES:

Student should do following allied activities related to project work chosen.

1. Be skillful in designing PCB using appropriate PCB designing software.
2. Roam around in electronics component shops to get required electronics components.
3. Prepare PCB by transforming schematic on copper cladded board at your own or contact local PCB industry to have PCB having professional touch means labeling of component, green masking and all other things.
4. Test all components, mount them on PCB and perform correct soldering by observing no short circuit among two pins or two pads.
5. Attach required wires and make project ready to be tested.
6. Arrange/ place your project in a wooden case or plastic box whenever giving demonstration while giving external viva.
7. Download appropriate software, learn it and make coding as per planning.

8. Explore internet to find out future expansion of your project. Search details like datasheets, working of various IC ,such other somewhat similar project, electronic components required for project, commercialization possibilities of your project ,government scheme for financial benefit/subsidy etc..
9. Prepare PPT for midterm and end of term presentation (minimum two presentations) and prepare hard bound project report as per directive of your project guide to be submitted in your department.
10. If students project has potential as a start up then after checking all possibilities student should apply for financial grant in student start up policy (SSIP) of state government run at your institute. .Guide should recommend group project for grant approval.
11. Group of students should organize mini project fair at institute level in co ordination with faculties and Head of Department.
12. Study of intellectual property rights for patenting the project.

9. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES:

Project Guide should go through the work done in fifth semester. Students have to perform remaining work which was left in semester fifth. In every weekly turn of project, guide should meet with all groups individually and evaluate their progress as per progressive assessment scheme. There should be two presentation like seminars with all students of 4th semester and all faculties .After presentation there must be an active interaction related to project .One presentation should kept in mid way of term and other presentation should kept at the time of submission. Mentor can arrange One day expert lecture on SSIP project to create awareness among students.

Assessment of Project work:

Guide should assess the project work in every weekly turn. Student group should give progress plan/timeline of project work to be done in first turn to their respective guide. Guide will monitor their progress as per timeline given by student. Every group should give two presentations each of 20 marks and documentation/project report is of 10 marks which comprises total 50 marks of Continuous assessment (CA).

Guide should maintain progress plan / weekly progress report of each group in following format:

Progress Report

Name of student: Enrollment No. :

Name of Project:

DATE	DETAILS OF PROJECT RELATED WORK CARRIED OUT	SIGNATURE OF GUIDE

Signature of student Guide HOD

Suitable number of rows can be added. Suggested rubrics for presentation and Documentation are as follows. Project Guide may implement his/her Rubric depending on the category of Project.

Rubrics for Presentation:

Activity	Technical Content of project (Innovative/Project Complexity/ Quality of Build and Components /Recent trends /expansion etc.)	Status of Hardware/ Coding	PPT content/style	Communication skill (Verbal/Non verbal)	Question Answer/Discussion
Weightage	**0 to 4 Marks**	**0 to 4 Marks**	**0 to 4 Marks**	**0 to 4 Marks**	**0 to 4 Marks**
Presentation-1 (20-Marks)					
Presentation-2 (20-Marks)					

Rubrics for Documentation/Project Report :

Activity	Report as per University format	Report Contents (Sequence, Bibliography, Resources etc.)	Presentation of Block diagram/Circuit/Flow Chart	Submission of weekly Progress Report	Overall Quality of Report
Weightage	**0 to 2 Marks**	**0 to 2 Marks**	**0 to 2 Marks**	**0 to 2 Marks**	**0 to 2 Marks**
Documentation (10-Marks)					

10. SUGGESTED LEARNING RESOURCES/ SOFTWARE/LEARNING WEBSITES

Student should visit following websites/URLs for better understanding of concept, availability of variety of circuits , Learning materials for working of project, expansion ideas of project, expert help in coding and documentation.

1. Instructables (www.instructables.com) - A platform with a wide range of DIY projects, including electronics.
2. Hackaday (www.hackaday.com) - A community dedicated to hardware hacking, electronics, and open-source projects.
3. Adafruit (www.adafruit.com) - A company that offers a variety of electronics products and tutorials.
4. SparkFun (www.sparkfun.com) - Another electronics retailer that provides educational resources and project ideas.
5. Make: (www.makezine.com) - Make: magazine's website offers a wealth of project ideas, including electronics and robotics.

6. Electronics-Lab (www.electronics-lab.com) - A website focused on electronics projects, circuits, and tutorials.
7. Electronics For You (www.electronicsforu.com) - An Indian website with electronics projects, news, and resources.
8. EEWeb (www.eeweb.com) - A community for electrical engineers and hobbyists, offering projects, forums, and resources.
9. All About Circuits (www.allaboutcircuits.com) - A comprehensive electronics website with articles, forums, and educational content.
10. Circuit Digest (www.circuitdigest.com) - An online platform that covers electronics projects, tutorials, and news.
11. ElectroSchematics (www.electroschematics.com) - Features a collection of electronics circuits and projects with schematics and descriptions.
12. DIYODE Magazine (www.diyodemag.com) - An Australian electronics magazine with projects and tutorials.
13. Circuit Basics (www.circuitbasics.com) - Offers tutorials and guides on electronics and Raspberry Pi projects.
14. Electronics Hub (www.electronicshub.org) - A resource for electronics enthusiasts with project ideas and tutorials.
15. Electronics Projects for You (www.electronicprojectsforu.com) - A website dedicated to electronics projects and resources.
16. Open Electronics (www.open-electronics.org) - Focuses on open-source hardware and DIY electronics projects.
17. Electronics Club (www.electronicsclub.info) - A beginner-friendly resource for learning electronics and building projects.
18. PCBWay (www.pcbway.com) - A PCB manufacturing service with a blog section featuring various electronic projects and tutorials.

11. PO-COMPETENCY-CO MAPPING:

Semester VI	Electronics and Communication Engineering Project-II **(Course Code:4361103)**						
	POs						
Competency & Course Outcomes	**Basic and Discipline specific knowledge**	**Problem analysis**	**Design/ development of solutions**	**Engineering Tools, Experimentation and Testing**	**Engineering practices for society, sustainability and environment**	**Project Management**	**Life-long learning**
Competency	**Test designed electronic circuit for a solution of real life problem by identify the problem and apply innovative, creative and logical approach for problem solving using Knowledge gain in diploma EC engineering.**						
Course Outcomes **CO1** Design PCB for intended electronic circuit.	3	1	2	2			1

CO2 Fabricate and Test PCB for proposed electronic circuit.	3	1	3	3	2		
CO3 Develop /Debug code using appropriate simulation software.			2	2			2
CO4 Prepare and present detailed report of project work.				1		2	
CO5 Develop leadership, team work, and interpersonal communication skill.				1	2		3

12. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

Sr. No.	Name and Designation	Institute	Contact No.	Email
1.	Shri S J Chauhan HOD (EC)	GP Palanpur	9427026618	sjcssc@yahoo.co.in
2.	Smt. K N Vaghela (HOD, EC)	GGP Surat	9825149296	kundanvaghela1@gmail.com

BoS Resource Persons

Sr. No.	Name and Designation	Institute	Contact No.	Email
1.	Dr. A S Pandya, Principal BoS Chairman Electrical & Allied Branches	BPTI, Bhavnagar	9426201171	aspandya22@rediffmail.com
2.	Dr. S N Sampat HoD & BoS Member EC	LE College Morbi.	9033777389	snsampat@gmail.com
3.	Shri U V Buch, LEC & BoS Member Branch Coordinator-EC	GP A'bad	9825346922	uvbuch@gmail.com