**FMTH0301/Rev.5.3**

# Laboratory Plan

### B.E in EC 2018-2022

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|---|---|
| Laboratory Title: **Mini Project** | Lab. Code: **17EECW301** |
| Total Hours: **60** | Duration of ESA Hours: **3 Hours** |
| ISA Marks: **50** | ESA Marks: **50** |
| Lab. Plan Author: **Ujwala Patil, Rohit Kalyani** | Date: **15-09-2020** |
| Checked By: **Dr.Nalini C Iyer** | Date: **15-09-2020** |

*Prerequisites***:**

This mini project requires the student to have knowledge of courses like engineering physics, mathematics, analog electronics, signals and systems, HDL, communication and programming concepts up to IV semester level.

*Theme:*

Theme of the mini project is decided based on the courses that students have taken till IV sem. Focus includes improving programming skills likeC/C++/java/HDL and system level thinking**.** Students also need to build GUI for the selected project.

## Course Outcomes (COs):

At the end of the course the student should be able to:

1.  Analyze and record the requirements for the identified problem
2.  Generate the design alternatives to meet desired functionality
3.  Select the optimal design for further development
4.  Transform the fundamental knowledge gained in the curriculum to Model / Design / Develop prototype / system for component / system to meet the identified requirements.
5.  Develop technical writing skills and presentation skills
6.  Work in a team to meet project requirements.

**Course Articulation Matrix: Mapping of Course Outcomes (CO) with Program Outcomes**

| Course Title:Mini Project | | | | | | | | | | | | | Semester:5 - Semester | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Course Code:17EECW301 | | | | | | | | | | | | | Year:2020-21 | | |

| **Course Outcomes / Program Outcomes** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PO13 | PO14 | PO15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.Analyze and record the requirements for the identified problem | | M | | | | | | | | M | | | | | |
| 2.Generate the design alternatives to meet desired functionality | | M | | | | | | | | | | | | | |
| 3.Select the optimal design for further development | | M | | | | | | | | | | | | | |
| 4.Transform the fundamental knowledge gained in the curriculum to Model / Design / Develop prototype / system for component / system to meet the identified requirements. | | | M | M | M | | | L | | | | L | M | | |
| 5.Develop technical writing skills and presentation skills | | | | | | | | | | M | | | | | |
| 6.Work in a team to meet project requirements. | | | | | | | | | M | | M | | | | |

Degree of compliance **L**: Low **M**: Medium **H**: High

## Competency addressed in the Course and corresponding Performance Indicators

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| **Competency: PO2.1** | Demonstrate an ability to identify and characterize an engineering problem |
| PI Code: 2.1.1 | Evaluate problem statements and identify objectives |
| **Competency: PO2.2** | Demonstrate an ability to formulate a solution plan and methodology for an engineering problem |
| PI Code: 2.2.4 | Compare and contrast alternative solution processes to select the best process. |
| **Competency: PO3.2** | Demonstrate an ability to generate a diverse set of alternative design solutions |
| PI Code: 3.2.2 | Build models, prototypes, etc., to develop diverse set of design solutions |
| **Competency: PO3.4** | Demonstrate an ability to advance an engineering design to defined end state |
| PI Code: 3.4.1 | Refine a conceptual design into a detailed design within the existing constraints (of the resources) |
| **Competency: PO4.3** | Demonstrate an ability to critically analyze data to reach a valid conclusion |
| PI Code: 4.3.3 | Represent data (in tabular and/or graphical forms) so as to facilitate analysis and explanation of the data, and drawing of conclusions |
| **Competency: PO5.2** | Demonstrate an ability to select and apply discipline specific tools, techniques and resources |
| PI Code: 5.2.2 | Demonstrate proficiency in using EDA tools |
| **Competency: PO8.2** | Demonstrate an ability to apply the Code of Ethics |
| PI Code: 8.2.1 | Identify tenets of the IEEE and ACM professional code of ethics |
| **Competency: PO9.3** | Demonstrate success in a team-based project |
| PI Code: 9.3.1 | Present results as a team, with smooth integration of contributions from all individual efforts |
| **Competency: PO10.1** | Demonstrate an ability to comprehend technical literature and document project work. |
| PI Code:10.1.1 | Read, understand and interpret technical and non-technical information |
| **Competency: PO10.2** | Demonstrate competence in listening, speaking, and presentation |
| PI Code: 10.2.2 | Deliver effective oral presentations to technical and non-technical audiences |
| **Competency: PO10.3** | Demonstrate the ability to integrate different modes of communication. |
| PI Code: 10.3.1 | Create engineering-standard figures, reports and drawings to complement writing and presentations |

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| **Competency: PO10.3** | Demonstrate the ability to integrate different modes of communication. |
| PI Code: 10.3.2 | Use a variety of media effectively to convey a message in a document or a presentation |
| **Competency: PO11.3** | Demonstrate an ability to plan/manage an engineering activity within time and budget constraints |
| PI Code: 11.3.2 | Use project management tools to schedule an engineering project so it is completed on time and on budget. |
| **Competency: PO12.1** | Demonstrate an ability to identify gaps in knowledge and a strategy to close these gaps. |
| PI Code: 12.1.2 | Identify deficiencies or gaps in knowledge and demonstrate an ability to source information to close this gap |
| **Competency: PO13.1** | Demonstrate an ability to develop acompetency to identify the different hardwareand software components of a complex |
| PI Code: 13.1.2 | Ability to identify the software components. |
| **Competency: PO13.2** | Demonstrate an ability to Identify and apply appropriate design principles for the development of hardware systems |
| PI Code: 13.2.1 | Ability to identify design principles for the development of hardware systems |
| **Competency: PO13.2** | Demonstrate an ability to Identify and apply appropriate design principles for the development of hardware systems |
| PI Code: 13.2.2 | Ability to use design principles for the development of hardware systems |
| **Competency: PO13.3** | Demonstrate an ability to Identify and apply appropriate design principles for the development of software systems |
| PI Code: 13.3.1 | Ability to identify design principles for the development of software systems |
| **Competency: PO13.3** | Demonstrate an ability to Identify and apply appropriate design principles for the development of software systems |
| PI Code: 13.3.2 | Ability to use design principles for the development of software systems |

## Review wise Plan

**List of reviews planned to meet the requirements of the course.**

| Category: Mini Project | | Total Weightage: 50.00 | | |
|---|---|---|---|---|
| **Review No** | **Evaluation criteria** | **No. of Lab Session(s) per batch (estimate)** | **Marks / Experiment** | Timeline |
| 1 | 1. Conversions of given need statement into problem statement (engineering requirements)   2.Read, understand and interpret technical and non-technical information. | 1.00 | 10.00 | 3rd Week of COE |
| | Learning Outcomes: The students should be able to: 1. Convert of given need statement into problem statement (engineering requirements) 2. Perform market survey/Literature survey and patent search | | | |
| 2 | 1.Project Planning (Gantt chart) and WBS (Work Breakdown Structure) 2.Functional block diagram (black box and white box), Morphological chart, Design specifications and Bill of Materials (BOM | 1.00 | 10.00 | 6th week of COE |
| | Learning Outcomes: The students should be able to: 1. Do project Planning (Gantt chart) and WBS(Work Breakdown Structure) 2. Write functional block diagram (black box and white box), Morphological chart, Design specifications and Bill of Materials (BOM) | | | |
| 3 | Review 3 1. Detailed block diagram, algorithm and programming 2. Simulation and Implementation | 1.00 | 15.00 | 9th week of COE |
| | Learning Outcomes: The students should be able to: 1. Develop detailed block diagram, algorithm and programming 2. Simulation and Implementation | | | |
| 4 | Review 4 1.Testing and | 1.00 | 15.00 | 14th Week of COE |

| | Optimization 2.Analysis of results 3.Report | | | |
|---|---|---|---|---|
| | Learning Outcomes: <br> The students should be able to: <br> 1. Testing and Optimization <br> 2. Analysis of results <br> 3. Report | | | |

## Guide lines for selection of a project:

1. The project needs to encompass the concepts leant in a subject/s studied in the previous four semesters, so that the student will learn to integrate, the knowledge base acquired to provide a solution to the identified need.

2. Project should be able to exhibit sensing, controlling and actuation sections.

3. The mini project essentially will comprise of two components:

   • The hardware design

   • The graphical user interface (GUI) for application and data analysis with report generation.
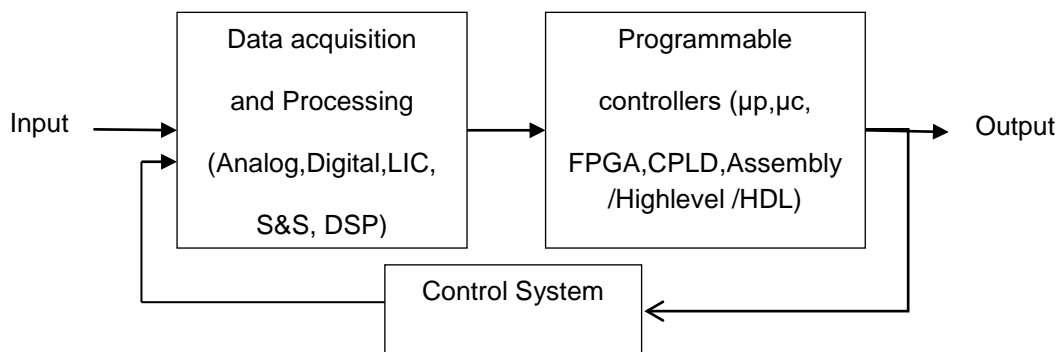


4. Student can select a project which leads to a product or model or prototype related to following areas (not limited to these areas).

   • Pulse and digital circuits: simulate the working of one or more circuits

   • Signals and systems: simulate the behavior of a system by considering different signals

   • Analog Electronic: simulate working of different devices

   • Control systems: simulate the behavior of a control system

   • Linear Integrated Circuits: simulate working of one or more circuits

   • Micro-controllers: simulate the ALU/control unit of microcontroller

5. Time plan: Effort to do the project should be between 120-150 Hrs per team, which includes self study of an individual member (80-100 Hrs) and team work (40-50hrs).

6. Learning overhead should be 20-25% of total project development time.

## Evaluation Process

**Continuous Internal Assessment (CIA)** is carried out through reviews and there exist 2 Committee reviews and 4 Guide reviews

### Role of review committee

1. Ensuring the right need – At the beginning of the semester

2. Ensuring the match between identified need and proposed solution in the form of POC/Prototype

### Role of the guide

1. Ensuring equal efforts of team members

2. Technical guidance

3. Ensuring project progress as per deadlines

4. Projection of projects in right platforms(Exhibitions, conferences, journals, patents)

### Review schedule

**Students will have a meeting with guide every week to update the progress and assessment will be carried on as per review schedule**

| Review No | Type of review | Marks allotted | Timeline |
|-----------|----------------|----------------|----------|
| 1 | Committee | 5 | 2$^{nd}$ week of semester |
| 2 | Guide | 5 | 3rd week of semester |
| 3 | Guide | 10 | 7th week of semester |
| 4 | Guide | 10 | 15th week of semester |
| 5 | Committee | 15 | 13th week of semester |
| 6 | Guide | 5 | 16th week of semester |

**Course Assessment Plan**

| Course Title: **Mini Project**Course Code: **17EECW301** | | | | | | |
|---|---|---|---|---|---|---|
| Course outcomes (COs) | Weightage in assessment | Assessment Methods | | | | |
| | | Review 1 | Review 2 | Review 3 | Review 4 | ESA |
| Analyze and record the requirements for the identified problem | 20% | √ | | | | √ |
| Generate the design alternatives to meet desired functionality | 13% | | √ | | | √ |
| Select the optimal design for further development | 13% | | √ | | | √ |
| Transform the fundamental knowledge | 30% | | | √ | √ | √ |

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| gained in the curriculum to Model / Design / Develop prototype / system for component / system to meet the identified requirements. | | | | | | |
| Develop technical writing skills and presentation skills | 10% | | | | √ | |
| Work in a team to meet project requirements. | 14% | | √ | | | |
| | Weightage | 10% | 20% | 7.5% | 12.5% | 50% |

**Review 1 Assessment Rubrics**

| This assessment to be carried at the initial stage of project |
|---|
| *Type of Assessment:* **Instructor Assessment** |
| CO addressed: **CO 1. Analyze and record the requirements for the identified problem** <br> **CO 4. Transform the fundamental knowledge gained in the curriculum to Model / Design / develop prototype / system for component / system to meet the identified requirements.** |
| Targeted Graduate Attributes: **GA 2, QA 8, QA 10 and QA 12** |
| Competencies targeted : **2.1Demonstrate an ability to identify and characterize an engineering problem** <br> **2.2Demonstrate an ability to formulate a solution plan and methodology for an engineering problem** <br> **8.2Demonstrate an ability to apply the Code of Ethics** <br> **10.1Demonstrate an ability to comprehend technical literature and document project work.** <br> **12.1Demonstrate an ability to identify gaps in knowledge and a strategy to close these gaps.** |

| PI addressed | Evaluation Parameters | Exemplary | Satisfactory | Developing | Unsatisfactory |
|---|---|---|---|---|---|
| **2.1.1** Evaluate problem statements and identify objectives | Conversion of given need statement into problem statement (engineering requirements) | Able to clearly define the objectives, constraints, functions for the defined need statement and arrive at engineering requirements | Able to clearly define the objectives, constraints, functions for the defined need statement but needs to arrive at engineering requirements. | Needs mentor intervention to arrive at objectives, constraints, functions for the defined need statement. | Able to vaguely define the objectives, constraints, functions even after mentor intervention |
| **2.2.4**Compare and contrast alternative solution processes to select the best process. | Identifying multiple solutions and selecting the best suited solution and justifications with support of technical literature | Developed alternate solutions and selection of optimal solution. | Developed alternate solutions but no evaluation. | Developed few (min 3) alternate solutions. | Not developed alternate solution. |

| 8.2.1 Identify tenets of the IEEE and ACM professional code of ethics | Understanding of professional ethics Copy right, plagiarism | Understands thoroughly and planned to address | Understands and considered | Understands and not considered | Does not understands |
|---|---|---|---|---|---|
| 10.1.1 Read, understand and interpret technical and non-technical information | Market survey/Literature Survey and Patent search | Able to identify related technical papers and patents and also able to compare with the requirement list. | Able to identify related technical papers and patents and are not able to compare with the requirement list | Able to identify related technical papers and patents and perform study only with mentors intervention | Not able to identify related technical papers and patents and perform study even after mentors intervention |
| 12.1.2 Identify deficiencies or gaps in knowledge and demonstrate an ability to source information to close this gap | Identify the gaps in research through literature survey | Able to identify the gaps and solution for the identified gaps | Able to identify the gaps but no solution | Able to identify the gaps with mentors intervention | Not able to identify gaps even with mentors intervention |
| Documents to be verified by Committee: **1. Student project book 2. Papers/patents 3. Report in the given template.** | | | | | |

| This assessment to be carried at the conceptual stage of project |
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| *Type of Assessment:* **Instructor Assessment** |
| CO addressed: **CO 2. Generate the design alternatives to meet desired functionality**<br>     **CO 3. Select the optimal design for further development**<br>     **CO6.Work in a team to meet project requirements** |
| Targeted Graduate Attributes: **GA 2, GA 5, GA 9, GA 1 and GA 11** |
| Competencies targeted: **2.1Demonstrate an ability to identify and characterize an engineering problem**<br>**2.2Demonstrate an ability to formulate a solution plan and methodology for an engineering problem**<br>**5.2Demonstrate an ability to select and apply discipline specific tools, techniques and resources**<br>**9.3Demonstrate success in a team-based project**<br>**10.1Demonstrate an ability to comprehend technical literature and document project work.**<br>**11.3 Demonstrate an ability to plan/manage an engineering activity within time and budget constraints** |

| PI addressed | Evaluation Parameters | Exemplary | Satisfactory | Developing | Unsatisfactory |
| --- | --- | --- | --- | --- | --- |
| 2.1.2Evaluate problem statements and identify objectives | Specification and identification of input & output. | Inputs, outputs are identified and are according to specs | Input and output are identified but not according to specs. | Input and output are identified. | Input and output are not identified. |
| **2.2.4** Compare and contrast alternative solution processes to select the best process. | Functional block diagram (black box and white box), Morphological chart, Design specifications and Bill of Materials (BOM) | Able to visualize the system holistically, identify inputs, outputs, draw functional flow diagrams, identify more than 3 means for each of the functions, make a choice of appropriate design variant and write design specifications, BOM | Able to visualize the system holistically, identify few of the inputs, outputs, draw functional flow diagrams, identify atleast 2 mean for each of the functions, make a choice of appropriate design variant and write design specifications, BOM very vaguely | Able to visualize the system holistically, identify few of the inputs, outputs, functional flow diagrams are not clear, identify only 1 mean for each of the functions, make a choice of appropriate design variant and write design specifications, BOM very vaguely | Though able to identify inputs and outputs of the system, functional flow diagrams are not clear, morphological chart, BOM are very vague |

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|---|---|---|---|---|
| **5.2.2**Demonstrate proficiency in using EDA tools | Simulation and Implementation | Able to demonstrate the proof of concept through simulation, bread board /PCB and show all the functionalities with analysis | Able to demonstrate the proof of concept through simulation, bread board /PCB with inadequate analysis | Able to demonstrate the proof of concept through simulation, bread board /PCB with partial analysis | Not able to demonstrate the proof of concept through simulation, bread board /PCB with no analysis |
| 9.3.1 Present results as a team, with smooth integration of contributions from all individual efforts | Project planning (Gantt chart) and WBS (Work Breakdown Structure). | Leader identified, and work has been distributed properly. | Leader identified, but work is not distributed properly | Leader identified, but work is not started | Work distribution is not done. |
| 10.1.2 Produce clear, well-constructed, and well-supported written engineering documents | Draft copy of first chapter of the report, "Introduction". | Done | Incomplete | Partial | Not done |
| **11.3.2** Use project management tools to schedule an engineering project so it is completed on time and on budget. | Project Planning (Gantt chart) and WBS (Work Breakdown Structure) | Able to use Gantt Project tool and do planning realistically, create WBS and assign roles to each of the team member, maintain design book with regular updates | Able to use Gantt Project tool and do planning realistically WBS needs to be done clearly and design book contains few updates | Able to use Gantt Project tool but planning needs to be realistic, WBS needs to be done clearly and design book contains no recent updates | Attempt is made but not able to use Gantt project tool properly WBS is not done and design book is not maintained correctly. |
| Documents to be verified by Committee: **1. Student project book 2. Report in the given template.** | | | | | |

**Review 3 Assessment Rubrics**

| This assessment to be carried at the detail design and implementation stage of project |
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| *Type of Assessment:* **Instructor Assessment** |
| CO addressed:   **CO 4** **Transform the fundamental knowledge gained in the curriculum to Model / Design / develop prototype / system for component / system to meet the identified requirements.** <br> **CO 5** **Develop technical writing skills and presentation skills** |
| Targeted Graduate Attributes: **GA 3,GA 10 and GA 13** |
| Competencies targeted: **3.2** **Demonstrate an ability to generate a diverse set of alternative design solutions** <br> **3.4** **Demonstrate an ability to advance an engineering design to defined end state** <br> **10.3** **Demonstrate the ability to integrate different modes of communication** <br> **13.2** **Demonstrate an ability to Identify and apply appropriate design principles for the development of hardware  systems** <br> **13.3** **Demonstrate an ability to Identify and apply appropriate design principles for the development of software systems** |

| PI addressed | Evaluation Parameters | Exemplary | Satisfactory | Developing | Unsatisfactory |
|---|---|---|---|---|---|
| **3.2.2** Build models, prototypes, etc to develop diverse set of design solutions | Testing and Optimization | Able to test the system for all possible test cases, validate the results for all test conditions. Optimization is done in all possible ways | Able to test the system for few of the test cases, validate the results for them. Optimization is done in few cases. | Able to test the system for one/two of the test cases, validate the results for them. Optimization can be done | Testing was not done properly and optimization is not done. |
| **3.4.1** Refine a conceptual design into a detailed design within the existing constraints | Detailed block diagram, algorithm and programming | Able to take forward the selected design variant and select appropriate algorithm, platform and programming concept. | Able to take forward the selected design variant, selection of appropriate algorithm, platform and programming concept but improvisation required. | Able to take forward the selected design variant, selection of appropriate algorithm, platform is done but programming needs major changes | Not able to take forward the selected design variant, has difficulty in selection of appropriate algorithm, platform and programming concept |
| *10.3.1* Create engineering-standard figures, reports and | Draft a copy of project report | Done | Incomplete | Partial | Not done |

| drawings to complement writing and presentations | | | | | |
|---|---|---|---|---|---|
| *13.2.1*Ability to identify design principles for the development of hardware systems | Detailed block diagram with all specifications/algorithms. | Functional block diagram is done with proper interconnections ofblocks according to specs. | Functional block diagram is done with proper interconnections of block but not according to specs | Functional block diagram is done but improper interconnections of block. | Incomplete block diagram |
| *13.3.1*Ability to identify design principles for the development of software systems | | | | | |
| Documents to be verified by Committee: **1. Student project book 2. Report in the given template.** | | | | | |

**Review 4 Assessment Rubrics**

| This assessment to be carried at the testing and reporting stage of project |
|---|
| *Type of Assessment:* **Instructor Assessment** |
| CO addressed:   **CO 4 Transform the fundamental knowledge gained in the curriculum to Model / Design / develop prototype / system for component / system to meet the identified requirements.** <br> **CO 5 Develop technical writing skills and presentation skills** <br> **CO 6 Work in a team to meet project requirements** |
| Targeted Graduate Attributes: **GA 4, GA 10, GA 11, GA 13** |
| Competencies targeted: **4.3 Demonstrate an ability to critically analyze data to reach a valid conclusion** <br> **10.2 Demonstrate competence in listening, speaking, and presentation** <br> **10.3 Demonstrate the ability to integrate different modes of communication.** <br> **11.3 Demonstrate an ability to plan/manage an engineering activity within time and budget constraints within time and budget constraints** <br> **13.2 Demonstrate an ability to Identify and apply appropriate design principles for the development of hardware  systems** <br> **13.3 Demonstrate an ability to Identify and apply appropriate design principles for the development of software systems** |

| PI addressed | Evaluation Parameters | Exemplary | Satisfactory | Developing | Unsatisfactory |
|---|---|---|---|---|---|
| **4.3.3** Represent data (in tabular and/or graphical forms) so as to facilitate analysis and explanation of the data, and drawing of conclusions | Analysis of results | Able to identify the correlation that exists between various variables in the system, represent the data suitably to reflect conclusions with justifications | Able to represent the data in tabular form and graphical form and only obvious conclusions are being able to draw | Though are able to collect data and represent data conclusions are very vague | Not able to draw conclusions from the obtained data. |

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| 10.2.2Deliver effective oral presentations to technical and non-technical audiences | Deliver effective oral presentation | Good presentation skills, clarity& language usage | The ppt is properly organized as per the recommended formatbut presentation was average | The ppt is not properly organized as per the recommended format and presentation was average | Presentation skills were below average |
| **10.3.1** Create engineering-standard figures, report and drawings to complement writing and presentations | Report | Able to comprehend all the details along with figures, tables and references in the given format and produce report in LateX form establishing continuity between various chapters | Able to comprehend all the details however figures, tables and references to be added. | Able to produce report in LateX form but requires to add figures, tables and references appropriately | Not able to produce report in LateX form. |
| 11.3.2Use project management tools to schedule an engineering project so it is completed on time and on budget. | Gantt chart and Budget for the project | Project is completed in time and is within the budget | Project is completed in time but exceeds the budget | Project is partially complete and exceeds the budget | Project is incomplete. |
| 13.2.2 Ability to use design principles for the development of hardware systems<br><br>13.3.2 Ability to use design principles for the development of software systems | Implementation, demonstration and analysis of results.(Pre optimization and post optimization discussion) | Design is complete, with all functional blocks in working condition.<br><br>Desired results are obtained and analyzed. | Design is completed in line with the specifications required.<br><br>Inadequate analysis. | Design of sub blocks is satisfactory, partial results but no analysis. | Design is incomplete in terms of specifications and sub-blocks.<br><br>No results and no analysis |
| Documents to be verified by Committee: **1. Student project book 2. Report in the given template.** | | | | | |

**End Semester Assessment** (ESA) includes submission of the project report, demonstration of the mini projects and Viva-voce conducted by the external and internal examiner. ESA carries 50% weight-age of total marks of mini project. The following assessment rubrics are followed to evaluate the student.

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| *This assessment to be carried at the end of the semester by both internal and external faculty* | | | | | |
| *Type of Assessment:* **Instructor Assessment** | | | | | |
| CO addressed:    **CO 4 Transform the fundamental knowledge gained in the curriculum to Model / Design / develop prototype / system for component / system to meet the identified requirements.** <br> **CO 5 Develop technical writing skills and presentation skills** <br> **CO 6 Work in a team to meet project requirements.** | | | | | |
| Targeted Graduate Attributes: **GA 3, GA 4, GA 9,GA 10** | | | | | |
| Competencies targeted:    **3.2 Demonstrate an ability to generate a diverse set of alternative design solutions** <br> **4.3 Demonstrate an ability to critically analyze data to reach a valid conclusion** <br> **9.3 Demonstrate success in a team-based project** <br> **10.3 Demonstrate the ability to integrate different modes of communication.** | | | | | |
| **PI addressed** | **Evaluation Parameters** | **Exemplary** | **Satisfactory** | **Developing** | **Unsatisfactory** |
| **3.2.2** Build models, prototypes, etc to develop diverse set of design solutions | Functionality (40% weightage) | Able to demonstrate fully functional prototype/POC meeting all the identified objectives, constraints and functions | Able to demonstrate fully functional prototype/POC meeting few of the identified objectives, constraints and functions | Able to demonstrate partially functional prototype/POC meeting few of the identified objectives, constraints and functions | Able to demonstrate partially functional prototype/POC meeting one or two of the identified objectives, constraints and functions |
| **4.3.3** Represent data (in tabular and/or graphical forms) so as to facilitate analysis and explanation of the data, and drawing of conclusions | Testing (20% weightage) | Able to test the system for all possible test cases, validate the results for all test conditions. Optimization is done in all possible ways | Able to test the system for few of the test cases, validate the results for them. Optimization is done in few cases. | Able to test the system for one/two of the test cases, validate the results for them. Optimization can be done | Testing was not done properly and optimization is not done. |

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| **9.3.1** Present results as a team, with smooth integration of contributions from all individual efforts | Team Work (20% weightage) | Able to present the work reflecting the integration of contributions from individuals and complementary skills possessed by team members are utilized. | Able to present the work but clear reflection of individual contributions and integration requires improvement. | Able to present the work reflecting only individual contributions but lacks coordination among team members | Able to present the work which has inconsistency and it is clearly reflected. |
| **10.3.2** Use a variety of media effectively to convey a message in a document or a presentation | Design Communication (20% weightage) | Able to communicate the various project phases in a clear way with in the stipulated time connecting to identified objectives and functions in the given need statement. | Able to communicate few of the project phases but requires clarity and maintain continuity. | Able to communicate but needs to improve presentation skills | Not able to communicate the essentials of project deliverables in an effective way. |
| Deliverables to be verified by examiners: **1.Report 2. Prototype/POC** | | | | | |

Date: 15-09-2020

Coordinator
School of Electronics and Communication Engineering