

EE045-4-3

Group Design Project

Student

Handbook

(Version 5 – October 2021)

School of Engineering

TABLE OF CONTENTS

CHAPTER NO.	TITLE	PAGE NO.
1.	Introduction to Group Design Project	3
1.1.	Objectives	3
1.2.	Learning and Programme Outcomes	3
1.3.	Group Design Project Process Flow	5
1.4.	Group Design Project Implementation	6
1.5.	Group Design Project Assessment	7
1.6.	Report writing format	10
1.7.	Group Design Project Submission Timeline	11
2.	Group Design Project Report Writing Format	12
2.1.	Group Design Project Report writing format	13
2.2.	Group Design Project Report specification	16
3.	Appendix	
	Appendix A – Specimen	18
	Appendix B – Citation and References	30
	Appendix C – Definition of Complex Problem Solving & Activities	36
	Appendix D – Peer and Self-Assessment of Group Design Project	38
	Appendix E – Presentation Forms	39
	Appendix F – Marking Rubrics	45

1 Introduction to Group design project

1.1 Objectives:

The engineering group design project is a stand-alone course similar to other subjects in the engineering programme degree. In this module, you will form a team and complete a group design work project incorporating all aspects of design from identifying a specific problem to a fully functional sustainable prototype and presentation in both written and oral formats.

In the module, students will Identify a complex engineering problem and prepare preliminary work, Present project proposals through research and analysis, Propose solutions to the complex problem, Evaluate and recommend a sustainable solution, Design a system, a component/device, or a computer program, Prepare design documentation and Review, Incorporate Engineering Economics, Engineering Management Tools and Techniques, Entrepreneurship and Environmental considerations, Design test and Validations, and Present complete design work.

Thus, this module is to expose you to the process of engineering design management and practices through the appropriate use of skills and knowledge learned throughout the programme. You are expected to utilize what you have learned in the previous modules (fundamental principles), learn new skills or concepts and include complex engineering problem (refer to appendix C) and achieve a design system, components, or processes integrating the core areas that meets the desired needs within the realistic constraints and within the time limit provided. You are expected to demonstrate the complex problem solving and analytical skills with appropriate consideration for public health and safety, cultural, societal and environmental considerations.

1.2 Course & Programme Learning Outcomes:

Course Learning Outcomes Attained:

At the end of the Group Design Project module, you should be able to:

1. Review the existing methods for the given complex engineering problem. (C5, PLO4)
2. Develop solution to implement proposed methodology for the given complex engineering problem. (C6, PLO3)
3. Explain professional engineering practices for safety, health, social, cultural and legal responsibilities in developing solutions. (C5, PLO6)
4. Review the sustainability and environmental considerations to the implemented solution. (C5, PLO7)
5. Explain project management execution, economic decision making and entrepreneurial considerations for the implemented solution. (C5, PLO11)
6. Demonstrate the ability to work effectively within multi-disciplinary settings. (A3, PLO9)
7. Defend the implemented solution through effective communication both orally and in written context. (A5, PLO10)

Program Learning Outcomes Attained:

PLO3: Ability to design innovative solutions for complex engineering problems.

PLO4: Ability to investigate complex engineering problems using research techniques.

PLO6: Ability to engage in professional engineering practice for safety, health, social, cultural and legal responsibilities in developing solutions for complex engineering problems.

PLO7: Ability to comprehend and demonstrate good practices of engineering in sustainable development and environmental considerations for the solutions of complex engineering problems.

PLO9: Ability to function effectively as a team leader or a member in a team within multi-disciplinary settings.

PLO10: Ability to communicate effectively and professionally on complex engineering activities.

PLO11: Ability to demonstrate entrepreneurship skills, engineering project management and economic decision making in multidisciplinary environments.

In this module, each PLO is directly and explicitly mapped to the CLOs as shown in **Appendices E & F**. Percentage of individual PLOs measured in this module is given below:

CLO	Learning Outcome	PO Assessed	Taxonomy Assessed	Component assessed	Percentage of Marks
CLO1	Review the existing methods for the given complex engineering problem.	PLO4	C5	Individual System – Literature Review	5%
CLO2	Develop solution to implement proposed methodology for the given complex engineering problem.	PLO3	C6	Individual System implemented and Integrated system and Enhancement	20%
CLO3	Explain professional engineering practices for safety, health, social, cultural and legal responsibilities in developing solutions.	PLO6	C5	Professional Engineering Practice	5%
CLO4	Review the sustainability and environmental considerations to the implemented solution.	PLO7	C5	Sustainability & Environmental considerations	10%
CLO5	Explain project management execution, economic decision making and entrepreneurial	PLO11	C5	Project Management, finance and Entrepreneurship	10%

	considerations for the implemented solution.				
CLO6	Demonstrate the ability to work effectively within multi-disciplinary settings.	PLO9	A3	Proposal, Mid-point and Final Individual Presentation	40%
CLO7	Defend the implemented solution through effective communication both orally and in written context.	PLO10	A5	Poster Presentation	10%

Thus, **the group design project work is** weighted at 100%, with 35% of the total contributed by an individual component and 65% of group component, with 50% for report and 50% for presentation.

1.3 GDP process flow

The Module lecturer introduces the module to the student during week 1 and hands out the assignment during the same week. During week 2, students are exposed to sustainability, environmental considerations, professional engineering practices, entrepreneurship, complex engineering activities, complex problem solving and GDP proposal presentation.

During week 3-4, formation and registration of the group to module lecturer shall be done. Each group shall present their proposal with current problem clearly stated, along with aim & objectives. Shall propose the methodology with new skills/ techniques / creativity /enhancement embedded, demonstrating sustainability along with the timeline to complete the work. This proposal presentation shall be evaluated by the Module lecturer along with two other experts of different programme called as GDP team, contributing to 10% group work mapped to CLO6-PLO9.

Upon approval, the group shall progress independently and the group leader shall conduct group meetings appropriately and monitor the progress of the group members according to the proposed timeline, for the next three weeks.

During week 8, Mid-point group presentation shall be conducted where the group leader presents the aim & objectives of the GDP, followed by the group members presenting their work done and finally the group leader concludes with the timeline to complete the work left out. This is again evaluated by the same GDP team, contributing to 5% group work and 10% individual work mapped to CLO6-PLO9.

Again, the group shall progress independently and the group leader shall conduct group meetings appropriately and monitor the progress of the group members according to the proposed timeline, for the next three weeks.

The group shall submit their GDP report during week 12, contributing 35% group work and 15% individual work. During week 13, final individual presentation is done, where the group leader presents the aim & objectives of the GDP, followed by the group members presenting their final work done and lastly, the group leader concludes on the aim & objectives. This is again evaluated by the same GDP team, contributing to 5% group work and 10% individual work mapped to CLO6-PLO9.

Lastly, poster presentation is done during week 14, where the group work is evaluated by the same GDP team along with an invited expert from industry, contributing to 10% group work mapped to CLO7-PLO10.

1.4 Group Design Project Implementation:

The Module Lecturer explains the entire process of the group design project.

Step 1: Group Formation

First a group has to be formed with two or three members and maximum of four members, involving a balanced mixture of students from different programme (CE/EE/ME/TE) depending upon the strength of the class. The Group must have a group name and the group must elect a group leader. Each team member of the group has to involve and develop the assigned task by the group leader

Step 2: Proposal Presentation & Approval

Once the group has been formed, the group has to present the proposal for approval.

The presentation must include the following:

- a. Must introduce the group with the group leader followed by the group members
- b. Current problem statement with reference
- c. Aim and objectives
- d. Justification for the research to be done
- e. Literature review – minimum of three current research papers
- f. Proposed methodology with the help of a block diagram or flow chart
- g. Justification on the enhancement or creativity or innovativeness included
- h. Justification on how the group project is sustainable
- i. Justification on how complex engineering problem is achieved
- j. Gantt chart showing the group component and the individual components allocated.
The individual work allocated must be equally divided among the group members.
- k. References

The module lecturer approves based on the criteria of g to j being satisfied. If not, the group will be asked to update accordingly and present again until the proposal is approved. The proposal approval must be done within the first six weeks.

Step 3: Individual Presentation

The individual presentation must cover the following:

- a. Introduction
- b. Literature review
- c. Methodology
- d. Investigation on tools/ techniques selected
- e. Concept design derived from fundamental engineering principles
- f. System implementation – constructional details, working principle, results, and

testing (data collection & data analysis)

g. Summary

Step 4: Group Presentation

All the individual work carried out by team members must be integrated and presented. The group presentation must cover the following:

- a. Introduction
- b. Integrated system & Enhancement– overall block diagram & working principle, testing and results
- c. Summary
- d. Professional Engineering Practices
- e. Sustainability and Environmental
- f. Project Management, Entrepreneurship and Finance – Gantt chart, marketing strategy and cost analysis
- g. Discussion – result analysis, sources of errors and troubleshooting methods employed
- h. Conclusion – relating to the objectives, limitations and future work

1.5 Group Design Project Assessment:

The group design project work is weighted at 100%, with 35% of the total contributed by an individual component and 65% of group component, with 50% for report and 50% for presentation.

Assessment Breakdown

1 INDIVIDUAL WORK (35%)

1.1 Review on the existing methods (5%) CLO1-PLO4-Cognitive C5

- a) **Review** on the past related work done by other researchers.
- b) **Justify** on the components to be used with proper comparison or investigation.

Individual component (10%) – either 1.2 or 1.3 or 1.4-CLO2-PLO3-Cognitive C6

1.2 Electronic / Mechatronic Circuit design development

- a) One of the team members must develop conceptual electronic / mechatronic circuit design of the system.
- b) **Compose** the circuit printed on PCB is working.
- c) **Develop** appropriate programs for the control application of the project.
- d) **Compose** on the individual test results obtained (data analysis), problems faced and troubleshooting methods employed with limitations.

1.3 Transceiver design development

- a) One of the team members must design the transceiver of the system.
- b) **Compose** the circuit working.
- c) **Develop** appropriate programs for the same.



Version 5: Oct 2021

- d) **Compose** on the individual test results obtained (data analysis), problems faced and troubleshooting methods employed with limitations.

1.4 Graphical User Interface (GUI) platform development

- a) One of the team members must be able to develop the GUI.
- b) **Develop** the GUI using appropriate software.
- c) **Compose** the GUI developed
- d) **Compose** on the individual test results obtained (data analysis), problems faced and troubleshooting methods employed with limitations.

1.5 Demonstration of the distinct individual component working (20%)-CLO6-PLO9-Affective A3

- a) **Demonstrate** the individual progress work done during the Mid-point Group presentation at week 8-9 and the final individual presentation at week 15.
- b) Each team member must be able to answer questions related to the individual component during the project presentation.

2 GROUP WORK (65%)

2.1 Introduction

- a) **Explain** the project background with clear problem statement and justification for the project.
- b) State the aim and objectives of the project

2.2 Designing the Complete system (10%)-CLO2-PLO3-Cognitive C6

- a) Develop the intended system and demonstrate the working principle.
- b) **Compose** the function and working of component used in the system.
- c) **Design** the circuit using adequate PCB software and fabricate.
- d) **Compose** on the enhancement done.

2.3 Professional Engineering Practices (5%)-CLO3-PLO6-Cognitive C5

- a) **Explain** on how the Professional engineering practices are adhered in developing your proposed method.
- b) **Explain** on the standards, rules, laws for safety, health, social, cultural, and legal responsibilities considerations taken into account.

2.4 Sustainability and Environmental (10%)-CLO4-PLO7-Cognitive C5

- a) **Explain** on how sustainability is achieved in your proposed method.
- b) **Explain** on the environmental considerations taken into account.

2.5 Project Management, Finance and Entrepreneurship (10%)-CLO5-PLO11- Cognitive C5

- a) **Explain** on how the Group design project is managed with the help of a Gantt chart.
- b) **Explain** the cost involved with the help of a tabulated cost incurred.
- c) **Explain** on the targeted market and considerable number of trends on marketing.

2.6 Discussion and Conclusion

- a) Organise the test results obtained (data analysis), problems faced and troubleshooting methods employed, limitations and future recommendations.
- b) Conclude on the aim and objectives.

2.7 Group project proposal presentation (10%)-CLO6-PLO9- Affective A3

- a) **Justify** the proposed method with all the aim and objectives of the project proposed in order to solve the current complex engineering problem during the Group project proposal presentation at week 3-4, based on the independent research done.
- b) Students must be able to answer questions regarding the project proposed for implementation.

2.8 Overall project working demonstration during Poster Presentation (10%) – CLO7-PL10-Affective A5

- a) **Defend** the implemented solution through oral communication in achieving all the objectives of the project during the poster presentation at week 14.
- b) Students must be able to answer hardware and software related question regarding the project during the demonstration.

2.9 Group Project updates (10%)-CLO6-PLO9-Affective A3

- a) **Demonstrate** the Group progress work done with the help of a Gantt chart during the Mid-point Group presentation at week 8 and the final individual presentation at week 13.
- b) Workflow and timelines must be met.

1.6 Report Writing Format

- a) Introduction (Group Work)
Discuss the background, problem statement, justification, aim and objectives, and literature review.
- b) Electronic / Mechatronic Circuit working (Individual component)
 - Review on the past related work done by other researchers.

- Compare on the tools and techniques selected with appropriate justification.
 - Explain how the circuit works and show the circuit diagram and PCB development.
- c) Graphical User Interface (GUI) programming (Individual component)
Use flow chart to explain the program flow.
- d) Transceiver (Individual component)
Explain the overall transceiver circuit and show any analytical derivation/ calculations for the design.
- e) Integrated system and Enhancement (Group Work)
- f) Professional Engineering Practices (Group Work)
- g) Sustainability and Environmental (Group Work)
- h) Project Management, Finance and Entrepreneurship (Group Work)
- i) Discussion and Conclusion (Group Work)
- j) References (Group Work)

1.7 Group Design Project Submission Timeline

- 1) **Failing to attend any or both presentation on the stated time will result in failing the presentation component and the marks for report will be penalised as the student's work cannot be validated.**

Week	Event	Activity	Assessment Marks %
1	Module Introduction & Group assignment is handed out	Student is introduced to the module by the module lecturer	
2	Sustainability & Report writing	Sustainability is lectured & briefing done on report writing by the module lecturer	
3-4	Group registration & Proposal Presentation & Approval	GDP team is invited to evaluate the proposal along with the module lecturer (2 members + ML)	10% (Group Component)
5-7	Independent work		
8	Mid-point Group presentation	Presentation done as a group, presenting the individual work done. GDP team is invited to evaluate the proposal along with the module lecturer (2 members + ML)	10% (Individual Component) + 5%

			(Group Component)
9-10	Independent work		
11	Report Submission Briefing	Briefing done by the Module lecturer	
12	Report Submission		50% (Report Submitted Group – 35%; Individual – 15%)
13	Poster Preparation & Final Presentation Briefing	Briefing done by the Module lecturer Final Individual Presentation (2 members +ML)	10% (Individual Component) + 5% (Group Component)
14	Poster Presentation	Poster evaluated by the IAP/Industry Panel along with the GDP team (1+2 members)	10% (Group Component)
	TOTAL (Group work – 65% & Individual work – 35% ; Report – 50% & Presentation – 50%)		100%

Group Design Project Report Writing Format

2.1 Group Design Project Report Writing Format (Only one report to be submitted by each group)

The project may be substantial and may take a variety of forms but the report should not exceed **15,000 – 20,000** words. DO NOT try to produce the biggest report possible. Quality is more important than quantity.

There are standards expected for the presentation of a report. You need not worry about these at the start of the group project. Full details are supplied separately in Appendix A.

Typically the format of the report should contain the following sections:-

Front cover Page

- Use for both hard cover and inside report
- follow format as attached in the Appendix A

Declaration of Originality

- follow format as attached in the Appendix A

Acknowledgement

- follow format as attached in the Appendix A

Abstract

- outline the problem
- give summary of the results
- not more than ½ page in length

Table of Contents

- include page numbers

List of Figures

- follow format as attached in the Appendix A

List of Tables

- follow format as attached in the Appendix A

List of Symbols, Abbreviations and Nomenclature

- follow format as attached in the Appendix A

List of Appendices

- follow format as attached in the Appendix A
- Organization of the rest of the chapters

Introduction to the study

- a. Introduction
- b. Research problem
- c. Aim and objectives
- d. Justification to the research
- e. Organization of the rest of the chapters
- f. Summary

Individual chapters

- a. Introduction
- b. Literature review
- c. Investigation on materials/ components selection
- d. Methodology
- e. Concept design derived from fundamental engineering principles
- f. System implementation – constructional details, working principle, results, and testing (data collection & data analysis)
- g. Summary

Integrated System and Enhancement

- a. Introduction
- b. Integrated system and Enhancement – overall block diagram & working principle, testing and results
- c. Summary

Professional Engineering Practices

Sustainability and Environmental

Project Management, Finance and Entrepreneurship

- a. Gantt chart,
- b. Cost analysis, and
- c. Marketing

Discussion and Conclusion

- a. Discussion must include result analysis, sources of errors and troubleshooting methods employed and
- b. Conclusion must be relating to the objectives, limitations and future work

REFERENCES

References/Bibliography

- follows format as attached in the Appendix B

APPENDICES

Depending on Project

- Appendix A : Material selection (optional)
- Appendix B : Program code
- Appendix C : Data sheet
- Appendix D : Peer Evaluation Form

2.2 Group Design Project Report Specifications

2.2.1 Page Dimension and Binding Specification:

The dimension of the project report should be in A4 size. Submission should be made online as per instructions from your Module Lecturer. All the pages shall be numbered consecutively through the main text including photographs and/or diagrams included as whole pages.

2.2.2 Abstract:

It should be to half a page synopsis of the project typed double line spacing, Font Style Times New Roman and Font Size 12.

2.2.3 Table of Contents:

The table of contents should list all the topics following it as well as any topic which precedes it. The title page will not find a place among the items listed in the table of contents. **The page numbers starting from the front page must be counted with lower case Roman letters until the list of appendices, centered at the bottom of the page in Times New Roman 12 font style. Page numbers must be displayed from the second page onwards.** One and a half spacing should be adopted for typing the matter under this head. A specimen copy of the Table of Contents of the project report is given in **Appendix A**.

2.2.4 List of Figures:

The list should be exactly the same captions as they appear below the figures in the text. One and a half spacing should be adopted for typing the matter under this head. The captions should be placed below the figure.

2.2.5 List of Tables:

The list should be exactly the same captions as they appear above the tables in the text. One and a half spacing should be adopted for typing the matter under this head. The captions should be placed above the table.

2.2.6 List of Symbols, Abbreviations and Nomenclature:

One and a half spacing should be adopted or typing the matter under this head. Standard symbols, abbreviations etc. should be used.

2.2.7 List of Appendices:

One and a half spacing should be adopted or typing the matter under this head. Standard symbols, abbreviations etc. should be used.

2.2.8 Chapters

The chapters are broadly divided as specified in section 2.1. The general text should be typed using the Font Style “Times New Roman, 12” with 1.5 line spacing. The page numbering must start from chapter 1 onwards, centered with the bottom of the page in Times New Roman 12 font style, with decimal number system. Equation numbering must be justified with curved brackets as per the chapters as shown below.

Example:

$$v_{FM}(t) = V_c \cos(2\pi f_c t + m_f \sin(2\pi f_m t)) \dots\dots\dots(3.1)$$

$$m_{FM-NB}(t) = A \cos(2\pi f_0 t + \phi(t)) \dots\dots\dots(3.2)$$

2.2.9 References

The listing of references should be typed 4 spaces below the heading “REFERENCES” in alphabetical order in 1.5 line spacing left – justified. The reference material should follow APA referencing style as in **Appendix B**.


.

.

Appendix A

Specimen

Specimen of typical cover and front page for Group Design project report:

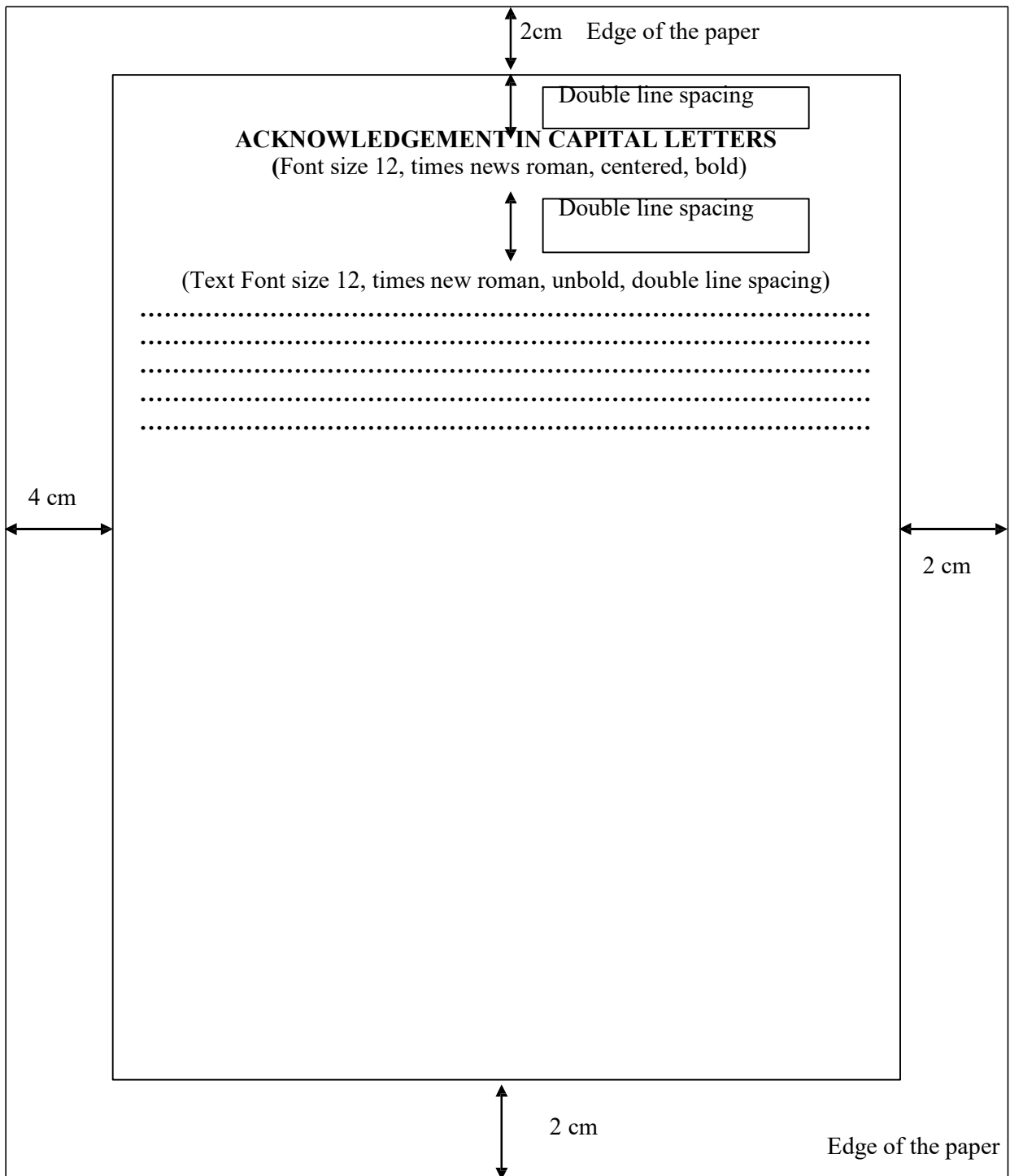
	 <p>PROJECT TITLE IN CAPITAL LETTERS, FONT SIZE 12, TIMES NEWS ROMAN, CENTERED, BOLD</p> <p>STUDENT NAME STUDENT NUMBER INTAKE PROGRAMME SUPERVISOR NAME</p> <p>A Group project</p> <p>ASIA PACIFIC UNIVERSITY OF TECHNOLOGY & INNOVATION SCHOOL OF ENGINEERING</p> <p>MONTH , YEAR</p>	
4 cm	2 cm	2 cm

Declaration of Originality:

Edge of the paper	
	2 cm
<div style="border: 1px solid black; width: 80%; margin: 0 auto; padding: 5px; text-align: center;">2 line spacing</div> <p style="margin: 10px 0;">DECLARATION OF ORIGINALITY IN CAPITAL LETTERS, (Font size 12, times news roman, centered, bold)</p> <div style="border: 1px solid black; width: 80%; margin: 0 auto; padding: 5px; text-align: center;">2 line spacing</div>	
<p>We hereby declare that this group project report is based on our original work except for citations and references which have been duly acknowledged. We also declare that we have not been previously and concurrently submitted for any other degree of award at APU or other institution. (Text Font size 12, times new roman, unbold, 1.5 line spacing)</p>	
4 cm	2 line spacing
<p>Signature: _____</p> <p>Name of the student1: _____</p> <p>TP No: _____</p> <p>Date: _____</p>	
2 cm	
2 cm	
Edge of the paper	

Acknowledgement

t format:



Group Design Project Abstract format:

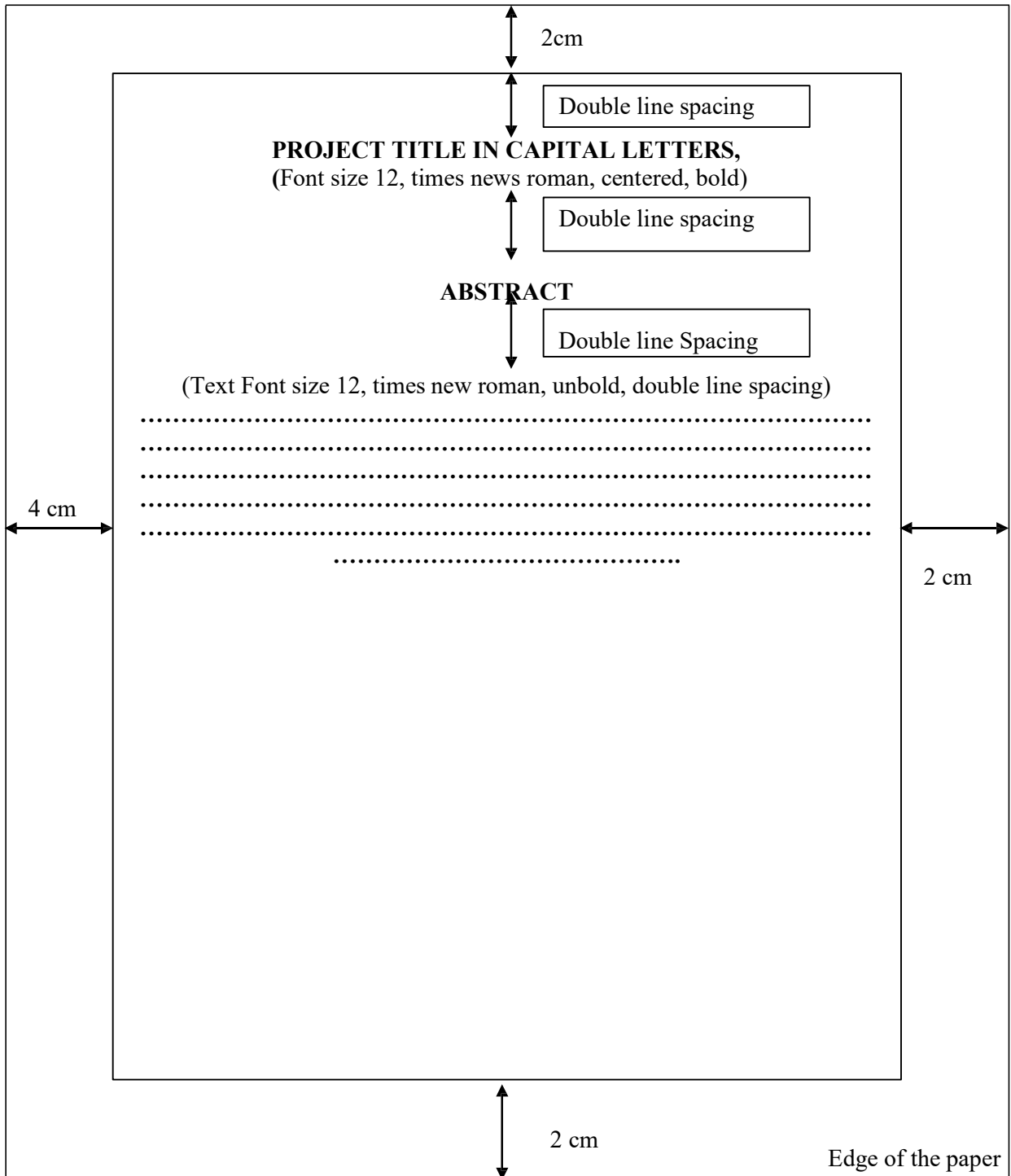


Table of Contents:

Edge of the paper		
<div style="border: 1px solid black; width: 150px; margin: 0 auto; padding: 2px;">Double line spacing</div>		
TABLE OF CONTENTS IN CAPITAL LETTERS, (Font size 12, times news roman, centered, bold)		
<div style="border: 1px solid black; width: 150px; margin: 0 auto; padding: 2px;">Double line spacing</div>		
CHAPTER NO.	TITLE	PAGE NO.
<div style="border: 1px solid black; width: 40px; margin: 0 auto; padding: 2px;">0.5"</div>		<div style="border: 1px solid black; width: 150px; margin: 0 auto; padding: 2px;">Double line Spacing</div>
<div style="border: 1px solid black; width: 100px; margin: 0 auto; padding: 2px;">ABSTRACT</div>		v
	TABLE OF CONTENTS	vi
	LIST OF FIGURES	vii
	LIST OF TABLES	viii
	LIST OF SYMBOLS, ABBREVIATIONS AND NOMENCLATURE	x
	LIST OF APPENDICES	xi
<div style="border: 1px solid black; width: 40px; margin: 0 auto; padding: 2px;">0.25"</div>		
<div style="border: 1px solid black; width: 100px; margin: 0 auto; padding: 2px;">1. INTRODUCTION</div>		1
<div style="border: 1px solid black; width: 40px; margin: 0 auto; padding: 2px;">0.25"</div>	1.1 Introduction	1
	1.2 Research Problem	2
	1.3 Aim and Objectives	3
	1.4 Justification to this research	4
	1.5 Organization of the rest of the chapters	5
	1.6 Summary	6
<div style="border: 1px solid black; width: 40px; margin: 0 auto; padding: 2px;">0.25"</div>		

		2cm	Edge of the paper
		Double line spacing	
CHAPTER NO.	TITLE	PAGE NO.	
		Double line Spacing	
2. CIRCUIT DESIGN		15	
2.1 Introduction		15	
2.2 Literature review		16	
2.2.1 Review based on sensors		16	
2.2.2 Review based on vision systems		20	
2.3 Methodology		25	
3. GRAPHICAL USER INTERFACE		20	2 cm
		2 cm	Edge of the paper

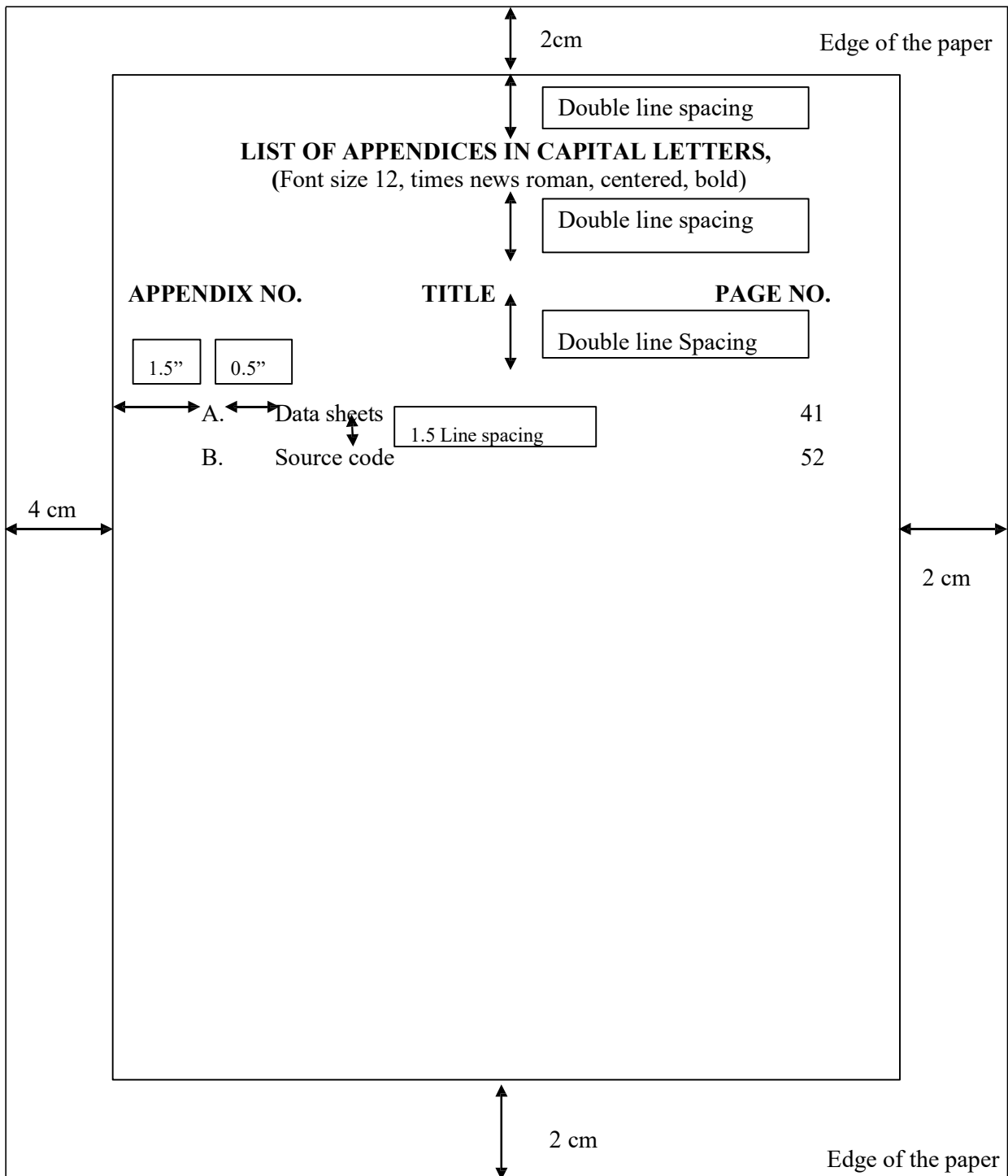
List of Figures:

<p style="text-align: center;">LIST OF FIGURES IN CAPITAL LETTERS, (Font size 12, times news roman, centered, bold)</p>			Double line spacing
			Double line spacing
			Double line Spacing
FIGURE NO.	TITLE	PAGE NO.	
0.5"	0.5"		
1.1	Block diagram	11	
1.2	System diagra	12	1.5 line spacing
1.3	Sensor	22	
2.1	Turbine	24	
3.1	Proposed block diagram	35	

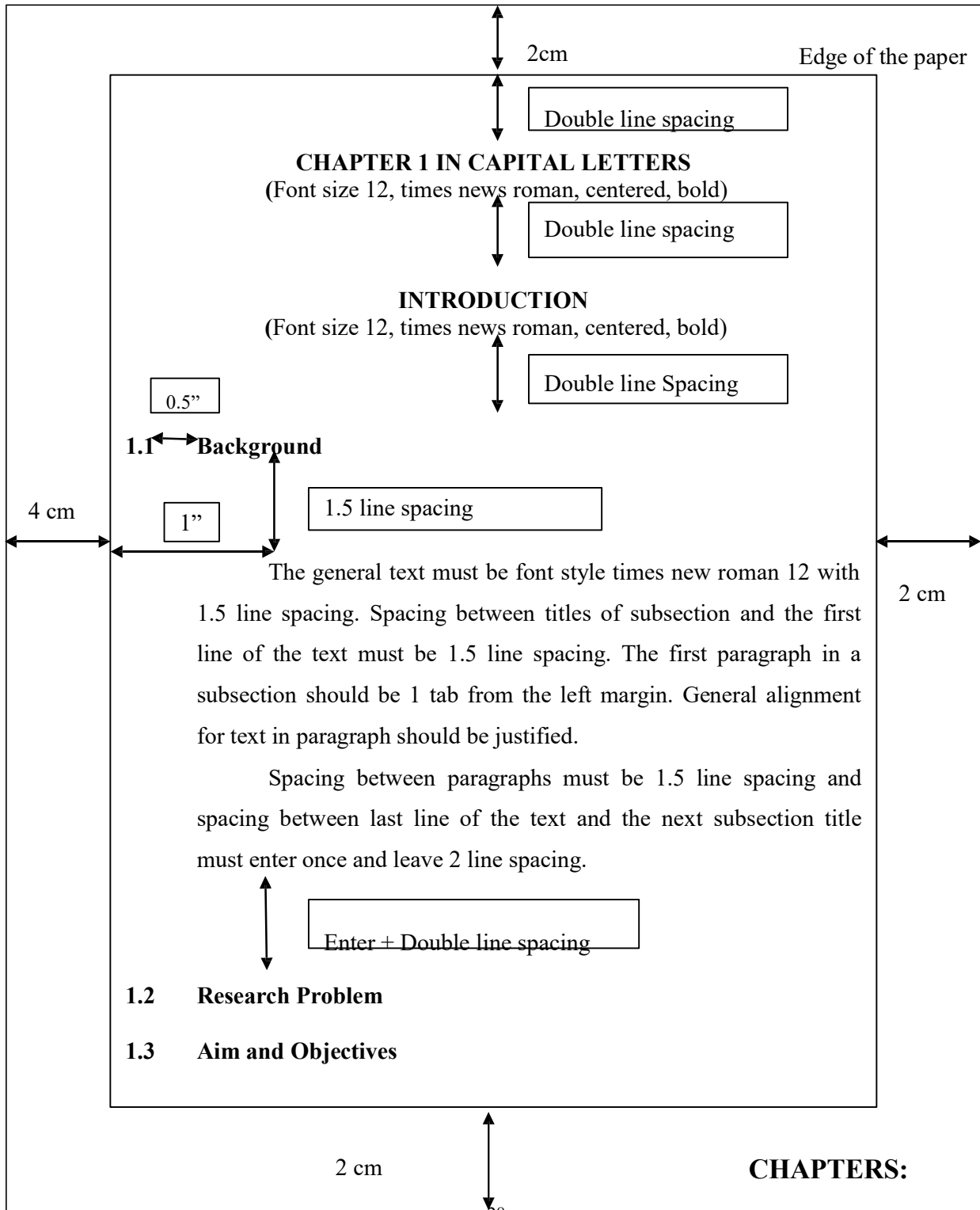
List of Tables:

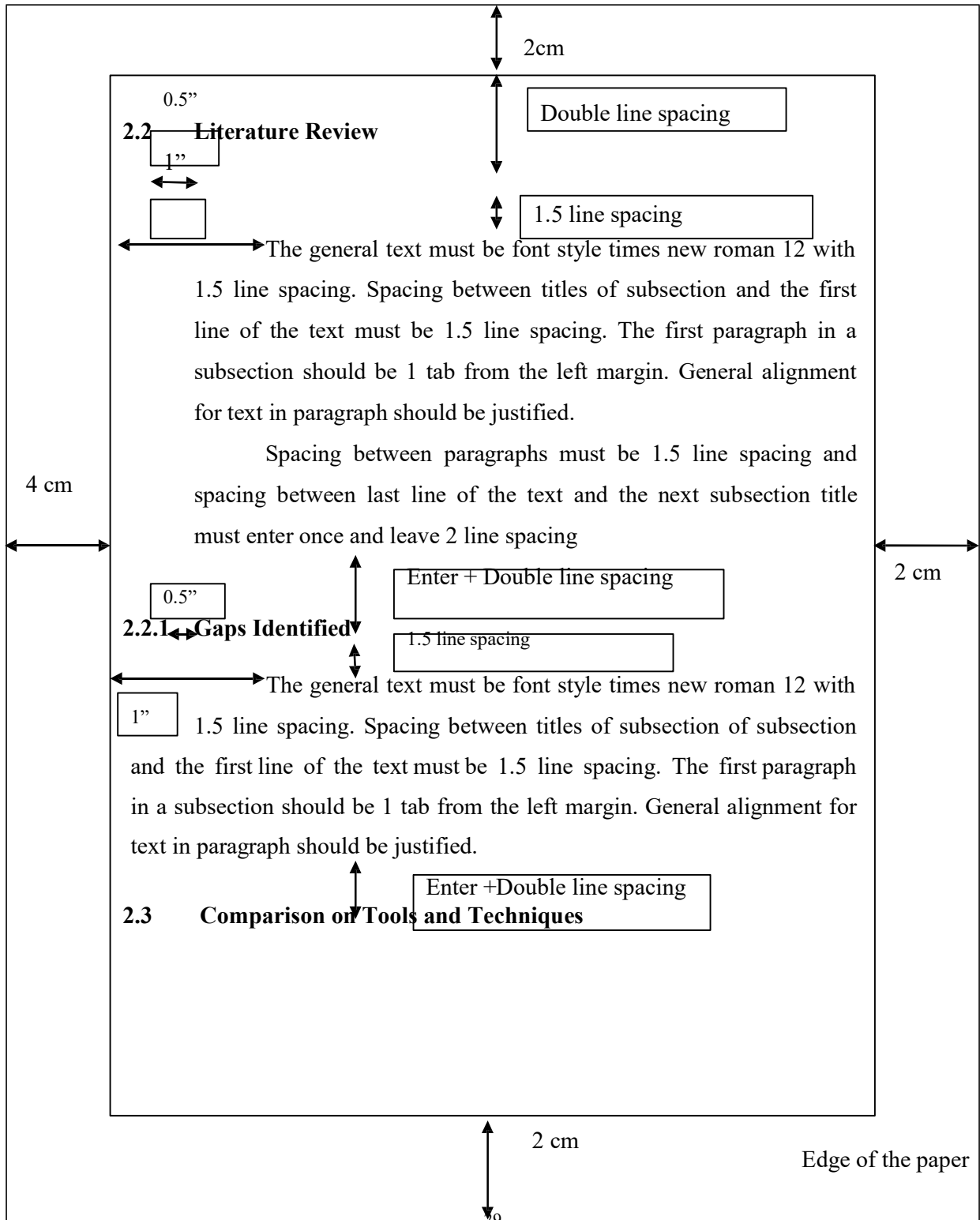
			2cm	Edge of the paper
			Double line spacing	
LSIT OF TABLES IN CAPITAL LETTERS, (Font size 12, times news roman, centered, bold)			Double line spacing	
			Double line Spacing	
TABLE NO.	TITLE	PAGE NO.		
0.5"	0.5"			
1.4	Block diagram	11	1.5 Line Spacing	
1.5	System diagram	12		
1.6	Sensor	22		
2.2	Turbine	24		
3.2	Proposed block diagram	35		
4 cm				2 cm
			2 cm	Edge of the paper

List of Appendices:



CHAPTERS:





Appendix B

Citation and References



Version 5: Oct 2021

How to Cite References

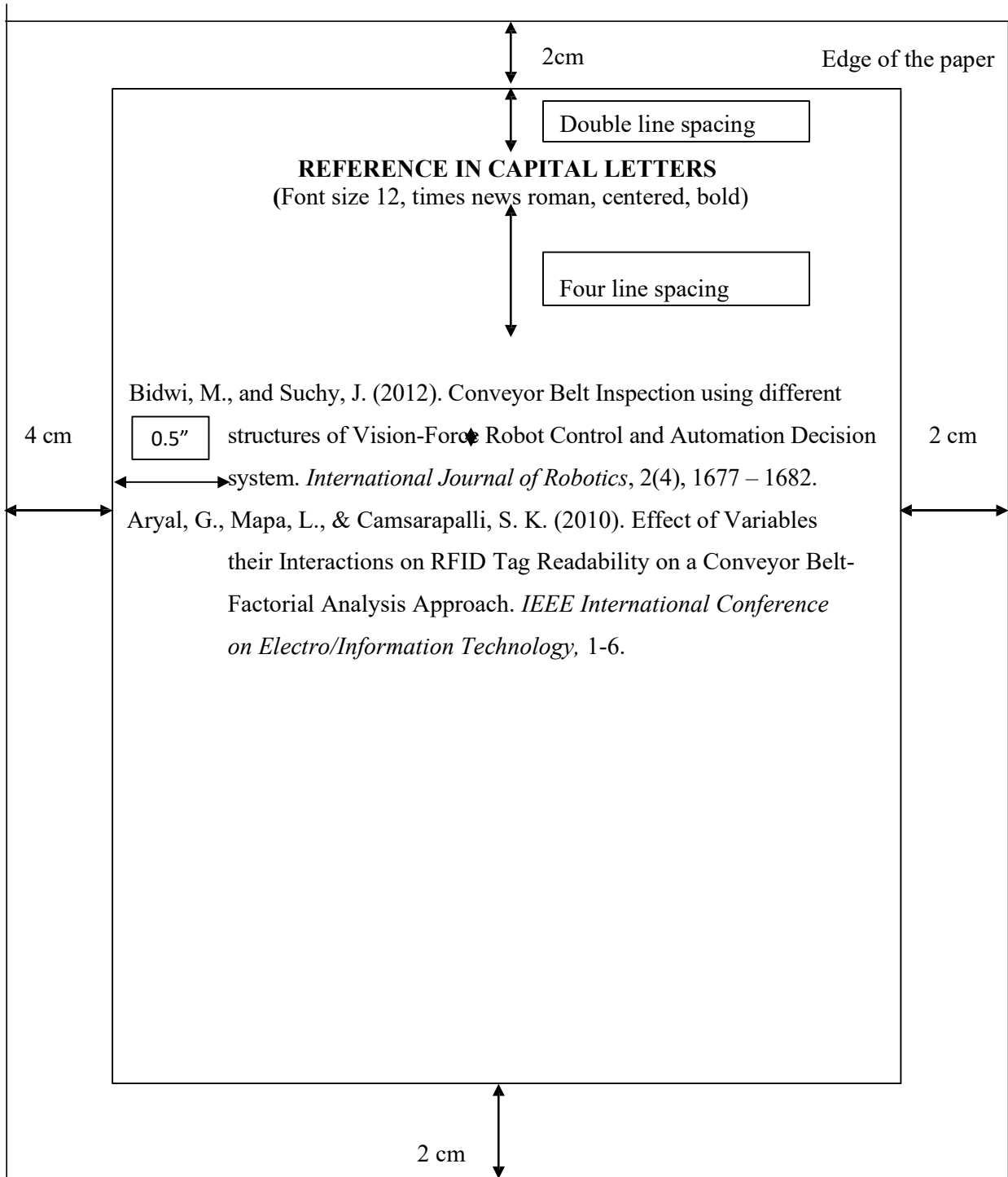
When you are writing your assignment or essay it is essential that you provide detailed and precise information on all the sources you have consulted (references). You may have used books, journal articles, newspapers, TV programmes, videos, the internet, government papers, statistics, etc. Every time you use quotations, or draw upon facts and arguments you must acknowledge your sources. This protects you from accusations of plagiarism (stealing other people's ideas and statements and passing them off as your own).

Citing your references also enables the reader to identify and trace the works that you used, and shows the authority on which you base your statements, demonstrates how well acquainted you are with the subject, and is a starting point for anyone else wanting to find out about the subject.

APA Referencing System

A number of methods exist for citing references. The Institution uses the APA Referencing Style, where APA stands for American Psychological Association.

REFERENCES SPECIMEN:



List of References:

All references used in carrying out the project and in producing the thesis must be listed in alphabetical order following the below given style and format.

Books:

Single author:

Format:

Family/Surname, Initials. (Year of Publication – in brackets). *Book Title* – in italics. Publisher.

Bibliography example:

Neville, C. (2010). *The Complete Guide to Referencing and Avoiding Plagiarism*. Open University Press.

In-text examples:

(Neville, 2010)

Neville (2010) commented that

“Direct quotations are placed in double quotations marks” (Author’s Surname, year of Publication, p. – followed by page numbers – in brackets)

Two authors:

Format:

Family/s Surname, Initials., & Family/Surname, Initials. (Year of Publication – in brackets). *Book Title* – in italics. Publisher.

Bibliography example:

Middleton, V. T. C., & Hawkins, R. (1998). *Sustainable Tourism: A Marketing Perspective*. Oxford: Butterworth- Heinemann.

In-text examples:

(Middleton & Hawkins, 1998)

As stated by Neville Middleton and Hawkins (1998)....

“Direct quotations are placed in double quotations marks” (First Author’s Surname & Second Author’s Surname, year of Publication, p. – followed by page numbers – in brackets)

Three or more authors:

Format:

Family/s Surname, Initials., Family/s Surname, Initials., & Family/s Surname, Initials. (Year of Publication – in brackets). *Book Title* – in italics. Publisher.

Bibliography example:

Bradbury, I., Boyle, J. & Morse, A. (2002). *The Scientific Principles for Physical Geographers*. Prentice Hall.

In-text examples:

(Bradbury et al., 2002)

As noted by Bradbury et al. (2002)....

“Direct quotations are placed in double quotations marks” (First Author’s Surname et al., year of Publication, p. – followed by page numbers – in brackets)

Journal article (printed journal article)

Printed article format:

Family/Surname, Initials. (Year of publication – in brackets). Title of article. *Title of journal - in italics*, Volume number (Issue number – in brackets), followed by page numbers.

Two authors:

Bibliography example:

Trefts, K., & Blaksee, S. (2000). Application of Image Processing For development of Automated Inspection System. *International Journal of Computational Engineering Research*, 28 (4), 369-378.

In-text examples:

(Trefts & Blaksee, 2000)

This supports Trefts and Blaksee’s (2000) evidence that...

“Direct quotations are placed in double quotations marks” (Author’s Surname, Year of Publication, p. – followed by page number – in brackets)

Journal article (online/electronic journal article)

Online article format:

Family/Surname, Initials. (Year of publication – in brackets). Title of article. Title of journal - in italics., Volume number (Issue number – in brackets), followed by page numbers. doi: xxxxxxxx

Single author:

Bibliography example:

Wilson, J. (1995). Enter the cyberpunk librarian: future directions in cyberspace. *Library Review*, 44(8), 63-72. doi: <http://dx.doi.org/10.1103/08670721311350>

In-text examples:

(Wilson, 1995)

According to Wilson (1995)....

“Direct quotations are placed in double quotations marks” (Author’s Surname, Year of Publication, p. – followed by page number – in brackets)

Conference Papers

Format:

Family/Surname, Initials. (Year of publication - in brackets). Title of Paper. *Full Title of Conference* - in italics, page numbers of paper.

Two authors:

Bibliography example:

Aryal, G., & Camsarapalli, S. K. (2010). Effect of Variables and their Interactions on RFID Tag Readability on a Conveyor Belt –Factorial Analysis Approach. *IEEE International Conference on Electro/Information Technology*, 1-6.

In-text example:

(Aryal & Camsarapalli, 2010)

Aryal & Camsarapalli (2010) noted that.....

“Direct quotations are placed in double quotations marks” (First Author’s Surname & Second Author’s Surname, Year of Publication, p. – followed by page number – in brackets)

Three or more authors:

Bibliography example:

Aryal, G., Mapa, L., & Camsarapalli, S. K. (2010). Effect of Variables and their Interactions on RFID Tag Readability on a Conveyor Belt –Factorial Analysis Approach. *IEEE International Conference on Electro/Information Technology*, 1-6.

In-text example:

(Aryal et al., 2010)

Aryal et al. (2010) noted that.....

“Direct quotations are placed in double quotations marks” (First Author’s Surname et al., Year of Publication, p. – followed by page number – in brackets)

Appendix C

Definition of Complex Problem Solving:

The range of complex problem solving is defined as follows:

SN	Attribute	Complex Problems have characteristic WP1 and some or all of WP2 to WP7
WP1	Depth of knowledge required	Cannot be resolved without in-depth engineering knowledge at the level of one or more of WK3, WK4, WK5, WK6 or WK8 which allows a fundamental-based, first principles analytical approach
WP2	Range of Conflicting requirements	Involve wide-ranging or conflicting technical, engineering and other issues.
WP3	Depth of analysis required	Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models.
WP4	Familiarity of issues	Involve infrequently encountered issues.
WP5	Extent of applicable codes	Are outside problems encompassed by standards and codes of practice for professional engineering.
WP6	Extent of stakeholder involvement and level of conflicting requirements	Involve diverse groups of stake holders with widely varying needs.
WP7	Interdependence	Are high level problems including many component parts or sub - problems

(Source: EAC STANDARD 2020)

Definition of Complex Engineering Activities:

The range of complex engineering activities is defined as follows:

SN	Attribute	Complex Activities mean (engineering) activities or projects that have some or all of the following characteristics:
EA1	Range of resources	Involve the use of diverse resources (and for this purpose, resources include people, money, equipment, materials, information and technologies).
EA2	Level of Interactions	Require resolution of significant problems arising from interactions between wide-ranging or conflicting technical, engineering or other issues.
EA3	Innovation	Involve creative use of engineering principles and research based knowledge in novel.
EA4	Consequences to society and the environment	Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation.
EA5	Familiarity	Can extend beyond previous experiences by applying principles based approaches.

(Source: EAC MAUAL 2020)

APPENDIX D

PEER AND SELF-ASSESSMENT OF GROUP DESIGN PROJECT

This form should be completed individually. There is no need to consult other group members on the completion of this assessment form.

Use the following score to mark the degree of your contribution and that of your colleagues to your group assignment.

0 = None (only to be given in exceptional circumstances)

1 = Very little

2 = Limited

3 = Some

4 = Considerable

5 = Outstanding

Assessment Criteria	Self	1	2	3	4
Attendance at group meetings (regularity, punctuality & cooperation)					
Contribution of ideas and suggestions for the assignment					
Efficiency in carrying out the task assigned by the group					
Acceptance of a fair share of the work					
Quantity of work done					
Quality of work done					
TOTAL					

Signature

Your name : _____

Member 1 : _____

Member 2 : _____

Member 3 : _____

Member 4 : _____

Date: _____

APPENDIX E

Group Design Project Proposal Presentation Form

Module Name & Code:	
Group Project Title:	
Group Leader Name & TP Number:	
Group Member Names & TP numbers:	
Description	Marks
Group Project Background	
	3
Clearly explained the existing situation and problem related to the project.	3,2
Lack of explanation related to the project.	1
Failed to provide and explain the existing system.	0
Problem Statement	
	3
Clearly stated the current or intended problem to be solved.	3,2
Problem to solve is stated but lacks on explanation.	1
Failed to state the current or intended problem to be solved.	0
Aim and Objectives	
	3
Clear aim and objectives to the problem stated.	3,2
Clear aim and objectives but minimally related to the problem stated.	1
Aim and objectives are not related to the problem stated.	0
Justification for this project	
	2
Justification provided is clearly intended to solve the problem stated in this project.	2
Justification provided is intended to solve the problem stated but lacks on clear explanation.	1
Failed to justify the reasons for this project.	0
Literature Review	
	2
Review carried out is highly relevant to the project.	2
Review carried out is relevant to the project.	1
No review has been carried.	0
Proposed Methodology	
	10
Proposed methodology is able to solve the complex engineering problem stated with sufficient level of engineering solution based on the independent research done.	7,8,9,10
Proposed methodology is able to solve the complex engineering problem stated with fairly adequate level of engineering solution based on the independent research done.	4,5,6
Proposed methodology is able to solve the complex engineering problem stated with limited level of engineering solution based on the independent research done.	1,2,3
Failed to propose methodology to solve the complex engineering problem with no evidence of research done.	0
Innovativeness/Creativity/Enhancement	
	3
High level of new skills/techniques/creativity/enhancement have been proposed.	3,2
Fewer new skills/techniques/creativity/enhancement have been proposed.	1
No new skills/techniques/creativity/enhancement.	0
Sustainability	
	2
Well-developed demonstration of sustainability in this project.	2
Developed demonstration of sustainability in this project.	1
No evidence of sustainable development in this project.	0
Gantt Chart	
	2
Provided with feasible plan to complete the project within feasible timeline, with feasible work breakdown.	2
Provided with feasible plan to complete the project within feasible timeline, but work breakdown is not feasible.	1
Failed to provide a feasible plan to complete the project within feasible timeline nor feasible work breakdown.	0
Total Group Mark (30 Marks)	
CLO6-PLO9-Final Scaled Group Percentage (10%)	

Group Design Project Mid-Point Presentation Form

Module Name & Code:				
Group Project Title:				
Group Member Name & TP Number:				
A. B. C. D.				
Student	A	B	C	D
Description	Marks			
Individual Progress and Participation in Group Work [CLO6-PLO9]	10	10	10	10
Individual demonstrated a very good progressive design / simulation / partial prototype. Individual completed all assigned tasks before the deadline and had a level of engagement that demonstrated a strong commitment to the class and the learning outcome. Individual's accomplished work is thorough, comprehensive, and advances the project. Individual actively helps other team members to complete tasks to a similar level of excellence.	7,8,9, 10	7,8,9, 10	7,8,9, 10	7,8,9, 10
Individual demonstrated a good progressive design / simulation / partial prototype. Individual completes tasks by or just after the deadline and has a level of engagement that demonstrated a commitment to the class and / or the learning outcome. Individual offers some suggestions to advance the work of the group. Individual engages team members by restating the views of other team members and / or asking questions for clarification, if any.	4,5,6	4,5,6	4,5,6	4,5,6
Individual demonstrated a better progressive design / simulation / partial prototype. Individual shares idea but do not advance the work of the group and has a level of engagement that did not demonstrate a commitment to the class or the learning outcome.	1,2,3	1,2,3	1,2,3	1,2,3
Individual did not make any progress and did not contribute to the project and failed to meet the responsibilities.	0	0	0	0
Group Work [CLO6-PLO9]	5	5	5	5
The group or team worked well together to achieve objectives. Each member contributed in a valuable way to the project. Progress done indicates a high level of mutual respect and collaboration. Full progress made and is according to the Gantt chart and also, demonstrated the further plan with timeline to complete the group design project.	4,5	4,5	4,5	4,5
The group or team worked well together most of the time, with only a few occurrences of communication breakdown or failure to collaborate when necessary. Members were mostly respectful of each other. Partial progress made and is according to the Gantt chart and also, demonstrated the further plan with timeline to complete the group design project.	2,3	2,3	2,3	2,3
The group or team did not collaborate or communicate well. Some members would work independently, without regard to objectives or priorities. A lack of respect and regard was frequently noted. No progress made but demonstrated the further plan with timeline to complete the group design project.	1	1	1	1
No group or team work evident. No progress made and no further plan to complete the group design project.	0	0	0	0
CLO6-PLO9				
Total Individual Mark (10 Marks)				
Total Group Mark (5 Marks)				

Group Design Project Final Individual Presentation Form

Module Name & Code:				
Group Project Title:				
Group Member Name & TP Number:				
A.				
B.				
C.				
D.				
Student	A	B	C	D
Description	Marks			
Individual Proposed Design Solution and Participation in Group Work [CLO6-PLO9]	10	10	10	10
Individual demonstrated a very good design / simulation / prototype fully with sufficient level of engineering solution. Individual completed all assigned tasks before the deadline and had a level of engagement that demonstrated a strong commitment to the class and the learning outcome. Individual's accomplished work is thorough, comprehensive, and advances the project. Individual actively helps other team members to complete tasks to a similar level of excellence.	7,8,9,10	7,8,9,10	7,8,9,10	7,8,9,10
Individual demonstrated a good design / simulation / prototype with fairly adequate level of engineering solution. Individual completes tasks by or just after the deadline and has a level of engagement that demonstrated a commitment to the class and / or the learning outcome. Individual offers some suggestions to advance the work of the group. Individual engages team members by restating the views of other team members and / or asking questions for clarification, if any.	4,5,6	4,5,6	4,5,6	4,5,6
Individual demonstrated a better design / simulation / prototype with limited level of engineering solution. Individual shares idea but do not advance the work of the group and has a level of engagement that did not demonstrate a commitment to the class or the learning outcome.	1,2,3	1,2,3	1,2,3	1,2,3
Individual did not make any progress and did not contribute to the project and failed to meet the responsibilities.	0	0	0	0
Group Work [CLO6-PLO9]	5	5	5	5
The group or team worked well together to achieve objectives. Each member contributed in a valuable way to the project. Progress done indicates a high level of mutual respect and collaboration. Full progress made and is according to the Gantt chart and also, demonstrated the further plan with timeline to complete the group design project.	4,5	4,5	4,5	4,5
The group or team worked well together most of the time, with only a few occurrences of communication breakdown or failure to collaborate when necessary. Members were mostly respectful of each other. Partial progress made and is according to the Gantt chart and also, demonstrated the further plan with timeline to complete the group design project.	2,3	2,3	2,3	2,3
The group or team did not collaborate or communicate well. Some members would work independently, without regard to objectives or priorities. A lack of respect and regard was frequently noted. No progress made but demonstrated the further plan with timeline to complete the group design project.	1	1	1	1
No group or team work evident. No progress made and no further plan to complete the group design project.	0	0	0	0
CLO6-PLO9				
Total Individual Mark (10 Marks)				
Total Group Mark (5 Marks)				

Group Design Project Poster Presentation Form

Module Name & Code:	
Group Project Title:	
Group Member Names & TP Numbers:	
A. B. C. D.	
Description	Marks
Problem Statement	3
Clearly stated the current or intended problem to be solved.	3,2
Problem to solve is stated but lacks on explanation.	1
Failed to state the current or intended problem to be solved.	0
Aim and Objectives	2
Clear aim and objectives to the problem stated.	2
Clear aim and objectives but minimally related to the problem stated.	1
Aim and objectives are not related to the problem stated.	0
Justification for this project	2
Justification provided is clearly intended to solve the problem stated in this project.	2
Justification provided is intended to solve the problem stated but lacks on clear explanation.	1
Failed to justify the reasons for this project.	0
Proposed Methodology	5
Proposed methodology is able to solve the problem stated with sufficient level of engineering solution.	4,5
Proposed methodology is able to solve the problem stated with fairly adequate level of engineering solution.	2,3
Proposed methodology is able to solve the problem stated with limited level of engineering solution.	1
Failed to propose methodology to solve the problem stated.	0
Testing & Evaluation	5
System designed is tested with adequate data collection and is evaluated appropriately.	4,5
System designed is tested with adequate data collection but is not evaluated appropriately.	2,3
System designed is tested with data collection but not adequately and is not evaluated.	1
System designed is not tested.	0
Innovativeness/Creativity/Enhancement	3
High level of new skills/techniques/creativity/enhancement have been used.	3,2
Fewer new skills/techniques/creativity/enhancement have been used.	1
No new skills/techniques/creativity/enhancement.	0
Sustainability	2
Well-developed demonstration of sustainability in this project.	2
Developed demonstration of sustainability in this project.	1
No evidence of sustainable development in this project.	0
Marketability	3
Able to market easily and provide the actual cost incurred.	3,2
Able to market but without the actual cost incurred.	1
Not able to market.	0
Effective Oral Communication	15
Explains points explicitly with specific explanatory detail; points relate to overall argument. Presents information in an appropriate, logical order for the complex engineering activity taken. The style and tone of the communication enhances its effectiveness; the information has discernible style and elegant.	12,13,14,15
Most points are elaborated upon with specific explanatory detail; and most points relate to overall argument. Organizes information in a mostly logical pattern for the complex engineering activity taken. The style and tone of the communication supports its effectiveness.	8,9,10,11
Points need further elaboration, many points do not relate to overall argument, and meaning is often unclear.	4,5,6,7



Version 5: Oct 2021

Makes some attempt to order information for the complex engineering activity taken. The style and tone of the communication supports effectiveness in some aspects and undermines it in others.	
Points are vague, with no relation to overall argument, and meaning is unclear. Lacks understandable pattern of organization for the complex engineering activity taken. The style and tone of the communication undermines its effectiveness.	0,1,2,3
Total Group Mark (40 Marks)	
CLO7-PLO10-Final Scaled Group Percentage (10%)	



Version 5: Oct 2021

APPENDIX F- MARKING RUBRICS

Criteria	Fail	Marginal Fail	Pass	Credit	Distinction
	0	1-4	5-6	7-8	9-10
Project Proposal presentation (10%) (Group) CLO6–A3-PLO9	<ul style="list-style-type: none"> Justified very poor or not justified any proposal as a team. 	<ul style="list-style-type: none"> Justified the proposed methodology based on the independent research done, but not according to the complex engineering problem stated as a team. 	<ul style="list-style-type: none"> Justified the proposed methodology based on the independent research done, with limited level of engineering solution for the complex engineering problem stated as a team. 	<ul style="list-style-type: none"> Justified the proposed methodology based on the independent research done, with adequate level of engineering solution for the complex engineering problem stated as a team. 	<ul style="list-style-type: none"> Justified the proposed methodology based on the independent research done, with sufficient level of engineering solution for the complex engineering problem stated as a team.
	0	1	2	3	4-5
Literature Review (5%) (Individual Chapter 2/3/4/5) CLO1-C5-PLO4	<ul style="list-style-type: none"> Reviewed methods/ design through literature review is very poor but irrelevant to the topic with outcomes/findings and drawbacks/limitations/gaps for future work. 	<ul style="list-style-type: none"> Reviewed methods/ design through literature review is poor but relevant to the topic with no outcomes/findings and drawbacks/limitations/gaps for future work. 	<ul style="list-style-type: none"> Reviewed methods/ design through literature review is average with outcomes/findings and drawbacks/limitations/gaps for future work. 	<ul style="list-style-type: none"> Reviewed methods/ design through literature review is good and highly relevant to the topic with outcomes/findings and drawbacks/limitations/gaps for future work. 	<ul style="list-style-type: none"> Reviewed methods/ design through literature review is excellent and highly relevant to the topic with outcomes/findings and drawbacks/limitations/gaps for future work.
	0	1-4	5-6	7-8	9-10
Electronic / Mechatronic Circuit Design and Development (10%) Applicable / Not Applicable (Individual Chapter 2/ 3/ 4/ 5) CLO2-C6-PLO3	<ul style="list-style-type: none"> Design circuits not shown and the final design badly sketched with no labeling/ did not explain on the working principle. 	<ul style="list-style-type: none"> Designed very poor or did not show any circuit designs and sketches not clear and neat and not labeled well and the working principle is barely explained. 	<ul style="list-style-type: none"> Designed but did not show all circuit designs and developed sketches are not clear and neat and not labeled well and the working principle is briefly explained. 	<ul style="list-style-type: none"> Designed all circuits and developed all sketches but might not be clear and neat and not labeled well and the working principle is sufficiently explained. 	<ul style="list-style-type: none"> Designed all circuits and developed all sketches clearly and neat and labeled well and the working principle is clearly explained.



Version 5: Oct 2021

Criteria	Fail	Marginal Fail	Pass	Credit	Distinction
	0	1-4	5-6	7-8	9-10
GUI Design Development (10%) Applicable / Not Applicable (Individual) Chapter 2/3/4/5) CLO2-C6-PLO3	<ul style="list-style-type: none"> Designed GUI is very poor or designs not shown and not done. 	<ul style="list-style-type: none"> Designed GUI is poor or did not show any GUI design, not clear and neat and not labeled well and explained barely the Pseudo codes of the developed program 	<ul style="list-style-type: none"> Designed GUI shown is not clear and neat and not labeled well and explained briefly on Pseudo codes of the developed program 	<ul style="list-style-type: none"> Designed GUI shown might not be clear and not labeled well and explained sufficiently on the Pseudo codes of the developed program 	<ul style="list-style-type: none"> Designed GUI shown is clear and neat and labeled well and explained clearly on the Pseudo codes of the developed program
Transceiver Design Development (10%) Applicable / Not Applicable (Individual) Chapter 2/ 3/ 4/ 5) CLO2-C6-PLO3	<ul style="list-style-type: none"> Designed very poor transceiver or designs not shown or not done. 	<ul style="list-style-type: none"> Designed poor or did not show any transceiver designs and sketches not clear and neat and not labeled well and explain barely the working principle. 	<ul style="list-style-type: none"> Designed but did not show all transceiver designs and developed sketches are not clear and neat and not labeled well and explained briefly on the working principle. 	<ul style="list-style-type: none"> Designed all transceivers and developed all sketches but might not be clear and neat and not labeled well and explained sufficiently on the working principle. 	<ul style="list-style-type: none"> Designed all transceivers and developed all sketches clearly and neat and labeled well and explained clearly on the working principle.
Integrated System and Enhancement (10%) (Group) CLO2-C6-PLO3	<ul style="list-style-type: none"> Proposed no modification. Developed group circuit simulation and circuit proto type is not working. Designed Bread-board is not working. Developed overall prototype as a solution for the complex engineering problem was not working. 	<ul style="list-style-type: none"> Proposed modification done is simple. Developed group circuit simulation and circuit proto type is working partially. Designed Bread-board is not fully working. Developed the overall prototype as a solution for the complex engineering problem was not working. 	<ul style="list-style-type: none"> Proposed modification done is moderate. Developed group circuit simulation is working properly and circuit proto type is working partially. Design based on bread-board is working. Developed the overall prototype as a solution for the complex engineering problem was working partially. 	<ul style="list-style-type: none"> Proposed modification done is unique in terms of the integrating existing techniques or systems. Developed group circuit simulation is working properly and circuit proto type is working partially. Designed PCB is not fully working. Developed the overall prototype as a solution for the complex engineering problem was working. 	<ul style="list-style-type: none"> Proposed modification done is creative and/or innovative with new skills involved. Developed group circuit simulation and circuit proto type is working properly. Designed PCB is fully working. Developed the overall prototype as a solution for the complex engineering problem was working.



Version 5: Oct 2021

Criteria	Fail	Marginal Fail	Pass	Credit	Distinction
	0	1-4	5-6	7-8	9-10
Professional Engineering Practices (10%) (Group) CLO3-C5-PLO6	<ul style="list-style-type: none"> Explained professional engineering practices are not relevant. 	<ul style="list-style-type: none"> Explained the professional engineering practices but not for safety, health, social, cultural and legal aspects. 	<ul style="list-style-type: none"> Explained the professional engineering practices for safety, health, social, cultural and legal responsibilities in developing solutions for complex engineering problems, but some of it being irrelevant. 	<ul style="list-style-type: none"> Explained the professional engineering practices for safety, health, social, cultural and legal responsibilities in developing solutions for complex engineering problems, but some of it being relevant. 	<ul style="list-style-type: none"> Explained in brief the professional engineering practices for safety, health, social, cultural and legal responsibilities in developing solutions for complex engineering problems.
Sustainability and Environmental considerations (10%) (Group) CLO4-C5-PLO7	<ul style="list-style-type: none"> Explained sustainability of design and environmental considerations are not explained 	<ul style="list-style-type: none"> Explained sustainability and environmental consideration linked to the proposed solution is weak 	<ul style="list-style-type: none"> Explained sustainability and environmental consideration linked to the design aspect is good 	<ul style="list-style-type: none"> Explained sustainability and environmental consideration linked to the design aspect is very good 	<ul style="list-style-type: none"> Explained sustainability and environmental consideration linked to the design aspect is outstanding
Project Management, Finance & Entrepreneurship (10%) (Group) CLO5-C5-PLO11	<ul style="list-style-type: none"> Explained project management, cost analysis and entrepreneurship is very poor or not given. 	<ul style="list-style-type: none"> Explained project management with the help of Gantt chart, cost analysis and marketing strategy provided is poor. 	<ul style="list-style-type: none"> Explained project management with the help of Gantt chart, and cost analysis is average and minimal identification of a target market provided. 	<ul style="list-style-type: none"> Explained project management with the help of Gantt chart and cost analysis is brief and clear understanding of target market provided. 	<ul style="list-style-type: none"> Explained project management with the help of Gantt chart and cost analysis is detailed, and excellent identification of one or more target markets with trends identified.



Version 5: Oct 2021

Criteria	Fail	Marginal Fail	Pass	Credit	Distinction
	0	1	2	3	4-5
Mid-point Group presentation – Group Progress updates (5%) (Group) CLO6-A3-PLO9	<ul style="list-style-type: none"> ▪ Demonstrated very poor or no group or team work evident. ▪ Justified very poor or no progress made and no further plan to complete the group design project. 	<ul style="list-style-type: none"> ▪ Demonstrated the group or team did not collaborate or communicate well, some members would work independently, without regard to objectives or priorities and a lack of respect and regard was frequently noted. ▪ Justified very poor or no progress made but demonstrated the further plan with timeline to complete the group design project. 	<ul style="list-style-type: none"> ▪ Demonstrated the group or team collaboration and communicated well only for a very few times, some members would work independently, without regard to objectives or priorities and members were almost respectful of each other ▪ Justified with initial progress made but demonstrated the further plan with timeline to complete the group design project. 	<ul style="list-style-type: none"> ▪ Demonstrated the group or team worked well together most of the time, with only a few occurrences of communication breakdown or failure to collaborate when necessary and members were mostly respectful of each other ▪ Justified partial progress made and is according to the Gantt chart and also, demonstrated the further plan with timeline to complete 	<ul style="list-style-type: none"> ▪ Demonstrated the group or team work well together to achieve objectives ▪ Justified progress done indicates a high level of mutual respect and collaboration. ▪ Justified full progress made and is according to the Gantt chart and also, demonstrated the further plan with timeline to complete the group design project.
	0	1-4	5-6	7-8	9-10
Mid-point Group Presentation - Individual Progress updates (10%) (Individual) CLO6-A3-PLO9	<ul style="list-style-type: none"> ▪ Demonstrated the Individual did not contribute to the project and failed to meet responsibilities, and the Individual did not identify the key performance criteria of successful teams or draw inference to own experience and no progress and timelines are not meet. 	<ul style="list-style-type: none"> ▪ Demonstrated the Individuality with low contribution to the project but failed to meet all the responsibilities and the Individual did not identify the key performance criteria of successful teams or draw inference to own experience and poor progress and timelines are not meet. 	<ul style="list-style-type: none"> ▪ Demonstrated the Individuality with an average contribution to the project but did meet all the responsibilities and the Individual is also able to identify some of the key performance criteria of successful teams and / or draw related connections for the group performance and average progress and timelines are not frequently met. 	<ul style="list-style-type: none"> ▪ Demonstrated the Individuality but did not contribute as heavily as others still met all the responsibilities and the Individual is also able to identify some of the key performance criteria of successful teams and / or draw related connections for the group performance and reasonable progress and timelines are frequently met. 	<ul style="list-style-type: none"> ▪ Demonstrated the Individual contribution in a valuable way to the project and the Individual is also able to articulate the key performance criteria of successful teams and evaluate the group performance accordingly and good progress and timelines are met.



Version 5: Oct 2021

Criteria	Fail	Marginal Fail	Pass	Credit	Distinction
	0	1	2	3	4-5
Final Individual presentation – Group Progress updates (5%) (Group) CLO6-A3-PLO9	<ul style="list-style-type: none"> ▪ Demonstrated very poor or no group or team work evident. ▪ Justified very poor or no progress made and no further plan to complete the group design project. 	<ul style="list-style-type: none"> ▪ Demonstrated the group or team did not collaborate or communicate well, some members would work independently, without regard to objectives or priorities and a lack of respect and regard was frequently noted. ▪ Justified very poor or no progress made but demonstrated the further plan with timeline to complete the group design project. 	<ul style="list-style-type: none"> ▪ Demonstrated the group or team collaboration and communicated well only for a very few times, some members would work independently, without regard to objectives or priorities and members were almost respectful of each other ▪ Justified with initial progress made but demonstrated the further plan with timeline to complete the group design project. 	<ul style="list-style-type: none"> ▪ Demonstrated the group or team worked well together most of the time, with only a few occurrences of communication breakdown or failure to collaborate when necessary and members were mostly respectful of each other ▪ Justified partial progress made and is according to the Gantt chart and also, demonstrated the further plan with timeline to complete 	<ul style="list-style-type: none"> ▪ Demonstrated the group or team work well together to achieve objectives ▪ Justified progress done indicates a high level of mutual respect and collaboration. ▪ Justified full progress made and is according to the Gantt chart and also, demonstrated the further plan with timeline to complete the group design project.
	0	1-4	5-6	7-8	9-10
Final Individual Presentation (10%) (Individual) CLO6-A3-PLO9	<ul style="list-style-type: none"> ▪ Demonstrated the Individual did not contribute to the project and failed to meet responsibilities and the Individual did not identify the key performance criteria of successful teams or draw inference to own experience and the demonstration was without any effort by the individual and the system developed was not working. 	<ul style="list-style-type: none"> ▪ Demonstrated the Individuality with low contribution to the project but failed to meet all the responsibilities and the Individual did not identify the key performance criteria of successful teams or draw inference to own experience and the demonstration showed the initial effort made by the individual to show the partially working system developed. 	<ul style="list-style-type: none"> ▪ Demonstrated the Individuality with an average contribution to the project but did meet all the responsibilities and the Individual is also able to identify some of the key performance criteria of successful teams and / or draw related connections for the group performance and the demonstration showed the minimal effort made by the individual to show the fully working system developed 	<ul style="list-style-type: none"> ▪ Demonstrated the Individuality but did not contribute as heavily as others still met all the responsibilities and the Individual is also able to identify some of the key performance criteria of successful teams and / or draw related connections for the group performance and the demonstration showed the average effort made by the individual to show the fully working system developed. 	<ul style="list-style-type: none"> ▪ Demonstrated the individual contribution in a valuable way to the project and the Individual is also able to articulate the key performance criteria of successful teams and evaluate the group performance accordingly and the demonstration showed the strong effort made by the individual to show the fully working system developed.



Version 5: Oct 2021

Criteria	Fail	Marginal Fail	Pass	Credit	Distinction
	0	1-4	5-6	7-8	9-10
Poster Presentation - Integrated System working & demonstration (10%) (Group) CLO7-A5-PLO10	<ul style="list-style-type: none"> Exemplified to fail or may not have turned up for communication and design is not complete. 	<ul style="list-style-type: none"> Exemplified to fail to fully communicate and understand the principles and elements of the complex engineering activity. Defended the design without creativity and originality, with developing quality and presented in an acceptable manner with 1-2 successful launches. Inadequate time usage and little evidence of successful audience analysis. 	<ul style="list-style-type: none"> Exemplified the principles and elements of the complex engineering activity through communication. Defended the design with originality, medium quality and presented in a somewhat professional manner with 2-3 successful launches. Adheres to time limitations and reflects appropriate analysis of the majority of the audience. 	<ul style="list-style-type: none"> Exemplified the principles and elements of the complex engineering activity through communication. Defended the design with originality, high quality and presented in a professional manner with 3-4 successful launches. Adheres to time limitations and reflects unusually insightful audience analysis. 	<ul style="list-style-type: none"> Exemplified the principles and elements of the complex engineering activity through communication. Defended the design with creativity, high quality and presented in a professional manner with 4-5 successful launches. Adheres to time limitations and reflects unusually insightful audience analysis.



Version 5: Oct 2021

Group Component Mark = _____

$$\text{Work Contribution Index} = \frac{\text{Obtained Peer Evaluation Mark}}{\text{The Highest Group Member's Mark}}$$

= _____ = _____

Work Contribution Index	Group Mark Index
0.95 – 1.00	1.0
0.90 – 0.94	0.9
0.85 – 0.89	0.7
0.75 – 0.84	0.6
0.55 – 0.74	0.5
0.35 – 0.54	0.3
0.25 – 0.34	0.1
0 – 0.24	0.0

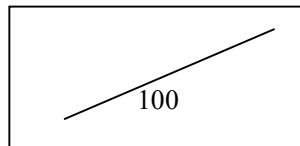
$$\text{Final Group Mark} = \text{Group Mark Index} \times \text{Group Component Mark}$$

=

$$\text{Total Mark} = \text{Final Group Component Mark} + \text{Individual Component Mark}$$

=

Total Marks



Lecturer: _____