Integrated Learning Experience

Guide Book for Work Based Learning

BACHELOR IN CIVIL ENGINEERING TECHNOLOGY

POLITEKNIK UNGKU OMAR

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FOREWORD

We would like to express our gratitude to the lecturers from the Bachelor of Civil Engineering Technology programme who have participated as co-authors and have contributed ideas to the development of this ebook. This work group was formed in order to commence developing an ebook that would serve as a guide for students who are participating in the Work Based Learning (WBL) programme.

This book is intended to serve as a guideline for both lecturers and students who are participating in the teaching and learning processes for the integrated courses BCT 7264, BCT 7275, and 7288. The guideline would assist students have a better understanding of the projects that would be carried out at WBL. It also serves as a guidelines for developing good and innovative projects for the respective industry. This ebook also serves as a guidebook for lecturers and students, guiding them through the process of assessment and helping them gain a better knowledge of the needs of the syllabus.

Furthermore, it has been demonstrated that such learning outcomes correlate to various levels of all four sections of the CDIO Syllabus, thus demonstrating that the course corresponds well to CDIO Standard 7, on Integrated Learning Experiences. Hopefully, not only will students benefit from this ebook, but so will the lecturers who are engaged as well.

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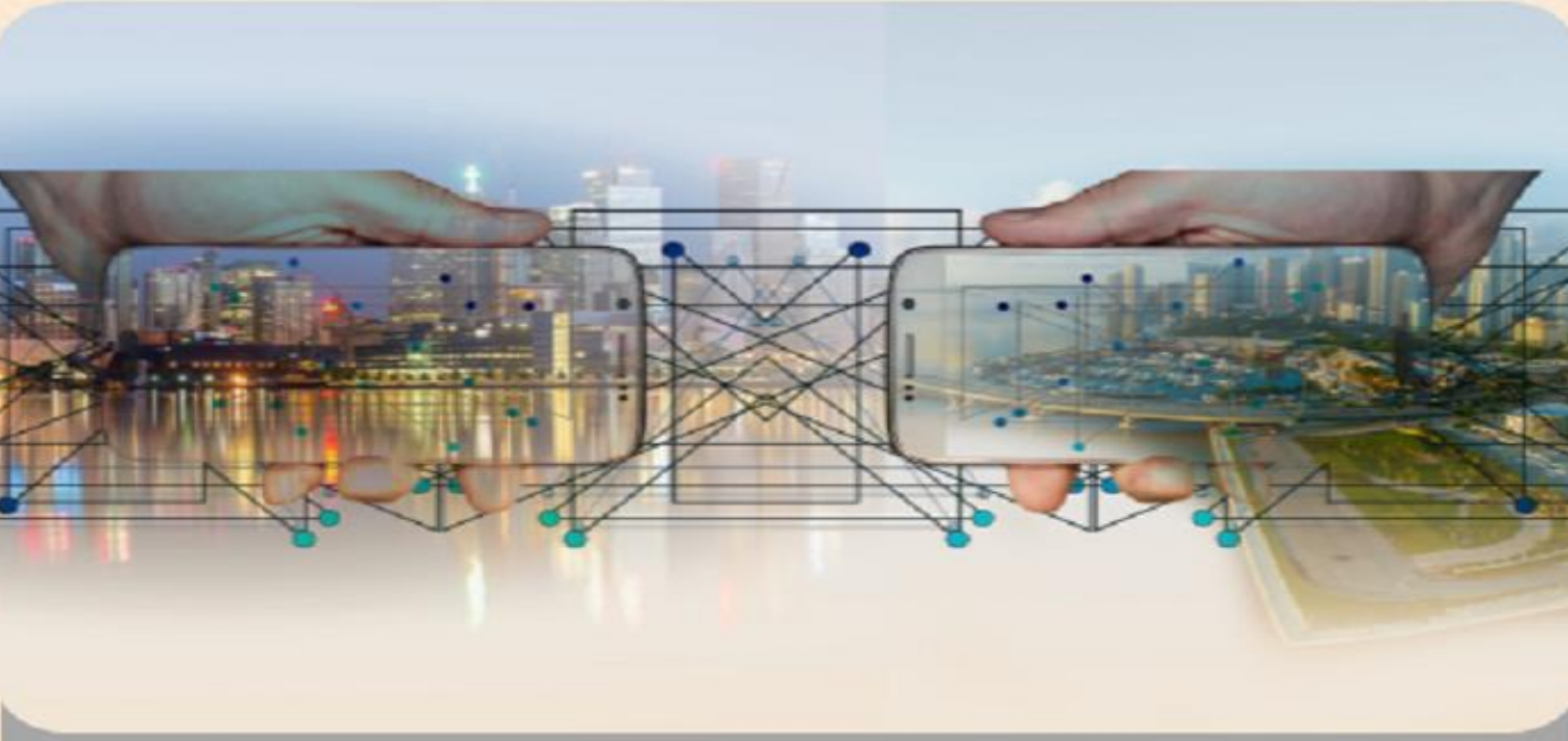


INTRODUCTION

A good education is a foundation for a better future

ELIZABETH WARREN

Introduction

Conceiving-Designing-Implementing-Operating (CDIO) was introduced to encourage problem-based learning. This strategy utilizes an aim to encourage innovative thinking, which assists students in acquiring problem-solving skills that build on theory and strengthen practical capabilities. The CDIO's project-based educational approaches are important because they give students practical experience in project settings that will prepare them for real-world engineering technology issues. Not only does the CDIO accomplish its own mission, but it also emphasizes the necessity of a well-rounded skillset, which includes personal and interpersonal abilities, to deal with the problems of the workplace.

Therefore, learning experiences that integrate disciplinary knowledge with personal and interpersonal abilities, as well as product, process, and system development skills, are referred to as integrated learning experiences (ILEs) in education. The concerns of professional engineering are taken into consideration in situations when they interact with disciplinary issues. During one project, students may evaluate the analysis of a product, the design of the product, and the social responsibility of the product's developer all at the same time.

Integrated Learning Experienced in WBL program guidelines are a set of notes of guidance that give techniques, resources, and assessment to assist you in implementing an ILEs program. Its purpose is to aid you in adapting the CDIO technique to a solved industrial issue.

Project Description

Intra-Program Integrated Learning Experience integrate 3 courses in semester 7 of the Bachelor in Civil Engineering Technology program to produce innovative project in solving industrial issues. The innovative project has integrated learning outcomes which infuses the CDIO skill sets of the 21st century skills.

1. Skills Development
    a. Use design thinking as a tool to integrate problem solving skills in developing innovation project in industry.
    b. Apply creative thinking skill in producing innovative project.
    c. Producing innovative project involving stakeholders collaboratively.

d. Communicate in oral presentation and written report effectively.

2. Assessment methodology
    a. Rubrics

Table 1: Course Mapping for Topics and Assesment

COURSES		TOPICS	ASSESSMENTS
BCT 7275	Technology and Innovation Management	Topic 2 : Organization Infrastructure And Culture Topic 3 : Innovation Process Design	Report & Presentation – 50%
BCT7288	Sustainable Construction Technology	Topic 1: Sustainable policy for civil and engineering construction Topic 2: Development of green civil and engineering construction Topic 3: Green materials for civil and engineering construction Topic 4: Green civil and engineering construction Implementation Topic 5: Sustainable civil and engineering construction solution	Report (30%) & Presentation (20%)
BCT7264	Research Method and Pre-Project	Topic 1 : Research Introduction Topic 2 : Research Topic Topic 3 : Research Framework Topic 4 : Research Proposal Topic 5 : Proposal Defence	Proposal (40%) & Presentation (20%)

Table 2: Design of Integrated Learning Experience

Project LOs	Courses	Related CLOs	Assessments
At the end of the project, students will be able to: 1. Integrate problem solving skills in developing innovation project using design thinking tool. 2. Utilise creative thinking skill in producing innovative project. 3. Produce an innovative project involving stakeholders collaboratively. 4. Communicate in oral presentation and written report effectively.	BCT 7275- Technology and Innovation Management	1. Analyse the importance of innovation in organization. (C4, PLO6) 2. Assess an innovative project related to the industry by using the Design Thinking process. (C5,PLO3) 3. Develop a viable innovative project.(A4,PLO10)	Report & Presentation
	BCT 7288- Sustainable Construction Technology	1. Compare the construction methods, materials and challenges development for civil engineering and construction activities through sustainable policies. (C5, PLO2) 2. Integrate the knowledge of the sustainability and impact of civil engineering and construction technology work in the solution of broadly-defined civil engineering problems in societal and environmental contexts. (A4, PLO6)	Report & Presentation
	BCT 7264- Research Method and Pre Project	1. Build initiative, intellectual achievement and comprehension of the chosen subject matter and employ the theoretical principles in practical situations. (P5, PLO6, LD4) 2. Produce project proposal based on knowledge and analysis in broadly-defined civil engineering problems (C6, PLO3, LD1) skills individually (A3, PLO7)	Proposal & Presentation

NOTES OF GUIDANCE

The best way to predict your future is to create it

ABRAHAM LINCOLN

Research Method And Pre-Project

1.0 Introduction

Research Method and Pre-project course is a compulsory course for all students before pursuing the Final Year Project. In this course, the student will be exposed in various aspect of research including types of research, method of literature review, research design, results and analysis, writing of thesis and journal and also presentation skills. The students will also be exposed to the problem solving methodology, decision-making and data collection process. This helps to prepare the students for Research Method and Pre-Project. At the end of this course, students should be able to understand all aspects of research, conduct research in a systematic way, solve and analyse data and results and write and present project proposal report.

All students of Bachelors in Civil Engineering Technology are required to undertake BCT 7264 – Research Method & Pre-Project which will last for one (1) long semester. As a part of the assigned work for this course, the students are required to complete a project proposal produced individually that is verified and further approved by your academic supervisors and as well as other academicians from the department. The entire course will be undertaken during the internship of the students at the industry where this specific system is called as Work Based Learning (WBL). Therefore, the project that will be proposed is based on their internship throughout the WBL system.

1.1 Course Learning Outcomes (CLO)

Upon completion of this course, students should be able to:

i. Plan a project work using proper research technique based on knowledge and understanding from broadly-defined civil engineering problems.
ii. Build initiative, intellectual achievement and comprehension of the chosen subject matter and employ the theoretical principles in practical situations.
iii. Show a professional and ethical conduct to complete a research and / or development of project.
iv. Produce project proposal based on knowledge and analysis in broadly-defined civil engineering problems.

1.2 Objectives

The aim is to enhance the students' knowledge and skills in solving a problem through structured project research at their respective industry, in order to produce a competent and productive engineer. Upon completing this course, the student should be able to:

i. Identify and describe the problem and scope of the project clearly
ii. Select, plan and propose a proper methodology in problem solving
iii. Work independently and ethically
iv. Present the proposed project in written and oral format effectively
v. Identify basic entrepreneurship skills in project management
vi. Expose students to the various aspects of research including types of research, methods of literature review, research designs, results and analysis, writing of thesis and journal and presentation skills.
vii. Provide students with an opportunity of in-depth exploration of a particular topic in the civil engineering technology, and to allow them to illustrate their expertise in a chosen area.

1.3 Assessment Requirements

To meet the course requirements, you will need to perform the following assessments:

1. Logbook- Updated every week.
2. Proposal
3. Presentation- A formal presentation session will be held.
4. Appraisal- Assessed by mentor/supervisor from the industry

1.4 Instructions

1.4.1 Research

i. There are various types of projects you can consider such as innovation, invention, improvement, but it must be in the predetermined field.
ii. Types of research; fundamental / basic research, applied research, action research, innovation and invention, research topics related to civil engineering.

iii. The project should focus on the industrial based-problem where a student will further look into industrial problem-based solving through their innovation/invention/product.

1.4.2 Criteria Project

High Impact and can be executed:

i. IR 4.0 (BiG data, Simulation)
ii. Practicality /user friendly
iii. Time: 1 semester, refer to course calendar prepared
iv. Sustainability (Present needs and Future needs)
v. Green (3R)
vi. Collaboration effective

1.4.3 Cost

i. Should propose the cost of the project as in prototype and in real case scenario.

1.4.4 Sustainable Development Goal (SDG)

i. The innovation / product / research are recommended to fulfill the Sustainable Development Goal (SDG) design by United Nation (UN) such as:

- Clean Water and Sanitation
- Affordable and Clean Energy
- Industry, Innovation, and Infrastructure
- Sustainable Cities and Communities

1.4.5 Marketable

i. The innovation / product / research should can be applied to institution / communities / industry.
ii. There must have the value of marketable.

1.4.6 Presentation

i. Presentation is held where at the end of this course students are required to defend their proposed project.
ii. The presentation focuses on from Chapter 1-Introduction, Chapter 2-Literature Review, Chapter 3-Methodology and Chapter 4-Expected Results.
iii. The presentation will be assessed by academicians.

1.4.7 Log Book

i. The logbook must be written every week and approved by their industrial mentor/supervisor.
ii. Detail, data, reference and discussion should be noted in the logbook.

1.4.8 Proposal

i. Prepare a proposal consist of Chapter 1 – Introduction, Chapter 2 – Literature Review, Chapter 3 – Methodology, Chapter 4 – Expected Results and References.
ii. Adopt the values of learning and continuing searching for advanced information related to the research topic to complete the Proposal writing.
iii. Must be submitted by Week 16.
iv. The minimum pages of a proposal are 20.
v. The proposal writing format is referred to the ***'Buku Panduan Projek Pelajar (Program Ijazah Sarjana Muda) edisi 2020'***.
vi. All the research / innovation / product are properties of Politeknik Ungku Omar.

1.4.9 Reference

i. Minimum 20 references comprising from books, journal, thesis and papers.
ii. Latest to 10 years back.
iii. All of reference must citing in the report writing using A.P.A format.

1.4.10 Assessment

i. Proposal – 40%
ii. Log Book – 20%
iii. Presentation – 20%
iv. Appraisal – 20%

1.4.11 Platform

i. Use CIDOS as the main platform to share information and document.
ii. Others platform such as email, what's app group and more are welcome to use in communication between all parties.

1.4.12 Project Diversity / Plagiarism

i. In the interest of diversity in projects, we should try to avoid duplicate projects.
ii. The projects with the same title will be advised to change.
iii. The project will eliminate if plagiarism detected.

1.4.13 Implementation during MCO and Post MCO

This Standard Operation Procedure (SOP) was developed as a guide for the implementation of course BCT 7264-Research Method & Pre-Project. This is a precautionary measure to prevent Covid-19 pandemics from spreading and infecting students.

a) Meetings / Discussion:

i. Live face-to-face hours should be limited / reduced.
ii. Encourage discussion is conducted online using the appropriate platform.
iii. Where live meetings / discussions are held, supervisors and students should:
iv. Always wear a face mask.
v. Keeping up with social distancing.
vi. Performed in a suitable open area.

b) Case Study:

i. The study was conducted using methods that involve close contact (less meeting with the public) such as distributing questionnaire forms.
ii. Time to conduct field studies should also be limited to shorter periods of time.
iii. Studies involving meetings should:
iv. Always wear a face mask.
v. Keeping up with social distancing.
vi. Get the contact information involved.
vii. Performed in a suitable open area.

c) Laboratory Testing:

i. Examination of the laboratory to be carried out should take into account location and close contact if carried out in the external laboratory.
ii. The laboratory tests should:
iii. Always wear a face mask.
iv. Keeping up with social distancing.
v. Wash your hands often.
vi. Limited use of labs at a time.
vii. Comply with SOP Post-CPP laboratory.

d) Assessment:

i. Presentation

- Online presentation via online with suitable platforms such as MS Team/ Google Meet/ Zoom.
- Presentation time limit: 20 minutes include 10 minute presentation and 10 minutes Q&A.
- Presenter turn will pick at random by panel before start.
- Power point of presentation must be handed to panel 2 days early . Content of Power point presentation consist:

SLIDE	CONTENT
1	**TITLE** Include supervisor and student's name.
2	**CONTENT** 1. Introduction 2. Problem Statement 3. Objective 4. Scope 5. Methodology 6. Gantt Chart 7. Proposed Budget 8. Expected Results
3	**INTRODUCTION** Brief introduction of the project/study.
4	**PROBLEM STATEMENT** Should highlight on the problem relating or surrounding reason on going forward and conducting specific study/project.
5	**OBJECTIVE** Should comprise minimum 2 or maximum 3 objectives.
6	**SCOPE** The main scope in the intended study/project in order to achieve the objectives.
7	**METHODOLOGY**
8	**GANTT CHART**
9	**PROPOSED BUDGET**
10	**EXPECTED RESULTS**

e) Preventive Steps:

i. Supervisors are encouraged to take other precautionary measures as necessary and appropriate.

ii. The steps taken should not reduce the performance of the course.

iii. The use of IoT (Internet of Things) is highly recommended for this time period.

1.5 Contents Of Chapters In Proposal

CHAPTER 1: INTRODUCTION

1.0 Introduction

In this section, introduction is to give a complete picture and explanation of the intended project/study. The introduction should focus and point out main issues that complies with the project/study that is intended to be carried out. The issues that are discussed connecting to the project/study should be explained in a brief manner consisting in few paragraphs with supporting citations.

1.1 Problem Statement

Problem statement refers to problems/issues which needs in depth study/research conducted based on it. Here, discussion on the problem/issue(s) that needs to be addressed and as well to be solved, either completely or partially, is therefore conducted in this section.

1.2 Objective

The objective of the study/project explains clearly what are the objectives that are intended to be achieved through this study/project. The number of objectives should usually comprise of 2-3 objectives based on the type of project conducted. The SMART criterion (S=Specific, M=Measurable, A=Achievable, R=Realistic and T=Time management) is highly recommended to be taken into consideration as guidance in determining the project's objective.

1.3 Scope of the study

The scope of the study explains the limitation in conducting the study/project, in the purpose to ensure the study does not stray from the intended scope or limitation.

CHAPTER 2: LITERATURE REVIEW

In the context of research/study, the definition of literature means published or unpublished research articles that are referred to in order to understand and further conduct study on the research problem. Literature review is not just a summary of researches/studies that have been conducted, but also useful in showing the various perspectives of the research completed (Kumar et al., 2013).

The selected citations that are quoted should be focused on the study. In literature review, it is important to show the source of reference by stating the name of the author and the year of publish. Methods of writing literature review:

i. Text/sentence……(author, year).
ii. According to author (year), text/sentence…..
iii. Text/sentence……(author et al., year).
iv. According to author et al., (year), text/sentence…..

et al. is for more than 2 authors

v. Author, (year) has stated/explained/elaborated/given..
vi. Author et al., (year) has stated/explained/elaborated/given..

CHAPTER 3: METHODOLOGY

Methodology is the systematic, theoretical analysis of the methods applied to a field of study. A methodology does not set out to provide solutions—it is therefore, not the same as a method. The methodology process designed for the intended project should be able to solve the issues/problem where this substantially allows for the aim and objectives of the research/study to be achieved. Therefore the flow of the methodology process should be well thought off from the beginning up to the end of the study/project. A clear picture and narration of this chapter should be clearly stated and discussed.

CHAPTER 4: EXPECTED RESULTS

This section should give a good indication of what you expect to get out of this project/study. It should join the data analysis and possible outcomes to the theory and questions that you have raised. It will be a good place to summarize the significance of the work. It is often useful from the very beginning of formulating your work to write one page for this section to focus your reasoning as you build the rest of the proposal.

REFERENCES

In academics and scholarship, an author-title-date information in bibliographies and footnotes, specifying complete works of other people. Copying of material by another author without proper citation or without required permissions is plagiarism. A reference may be a citation of a text that has been used in the creation of a piece of work such as an essay, report, or oration. Its primary purpose is to allow people who read such work to examine the author's sources, either for validity or to learn more about the subject. Such items are often listed at the end of an article or book in a section marked "Bibliography" or "References". A bibliographical section often contains works not cited by the author, but used as background reading or listed as potentially useful to the reader. A reference section contains only those works cited by the author(s) in the main text.

Example of writing references:

1. Books:

Race, P. (2002). How To Get A Good Degree: Making The Most of Your Time At University. Buckingham: Open University Press.

2. Books by 2 or 3 authors:

(i) Creme, P. & Lea, M. R. (2003). Writing at University. 2nd ed. Maiden: Open University Press.

(ii) Delamont, S., Atkinson, P., & Parry, O. (2004). Supervising The Doctorate: A Guide To Success. 2nd. ed. Maidenhead: Society for Research into Higher Education & Open University Press.

3. Citation on certain parts of the book, need to insert the pages:

Lees, R. H. (1974). Chemical Nomenclature Usage. Chischester: Ellis Horwood. pp. 314-36.

4. Articles from Journals:

Mikac, N. and Branica, M. (1994). Complexation of trialkyllead with diethyldithiocarbonate. Electroanalysis, 6(2), 37 – 43.

5. Articles from corporated documents:

Women Law Centre, (2002). Promise Still Owned to the Nation Young Women.

Washington DC: Women Law Centre.

6. Articles from thesis:

Razuhanafi, M. (2008). Modeling Non Motorised in Ipoh. Universiti Kebangsaan

Malaysia: Tesis Ph.D.

7. Articles from proceedings:

Alias, M. (2006). The effect of teacher generated concept maps on learning of secondary school physics. Proc. of the Second Int. Conference on Concept Mapping. San Jose, Costa Rica:Universidad de Costa Rica. pp. 550-557.

8. Articles from legal documents:

Malaysia, (1983). *Perintah Monumen Lama dan Tapak Tanah Bersejarah*: P. U.(A)41 1983.

9. Articles from standardization:

British Standards Institution (1987). Tongued And Grooved Software Flooring. London: BS 1297.

10. Articles from internet sources:

American Psychological Association, (2011). What's New in the Sixth Edition of the Publication Manual. (Retrieved from http://www.apastyle.org 2017)

***Titles in Bahasa Malaysia should be in italic.**

SIZE AND FORMATS:

1. **Paper size**

   Weight of paper – 80gram

   Size of paper – A4 (210mm x 297mm)

2. **Margin ruler**

   Size margin – 4cm from left, 2.5 cm from top, 2.5cm from bottom and 2.5cm from right

3. **Page numbering**

   Page numbers should be in the middle at the bottom of the page.

   CHAPTER 1 should start with number 1, followed by the rest of the pages.

4. **Numbering of Chapters and sub topics**

   Numbering of Chapters should be as CHAPTER 1, CHAPTER 2, CHAPTER 3, CHAPTER 4.

   Numbering of sub topics are as the example shown below:

   For CHAPTER 1

   1.1 Sub topic

   1.2 Sub topic

   1.2.1 Sub-sub topic

   1.2.1.1 Sub-sub-sub topic

TYPING:

Font – Times New Roman

Font size – 12

Line spacing – 1.5

Words in text if besides English should be in italic.

Text Alignment – Justified

Each chapters should be typed in capital letters and should be in the middle of the page between left and right. Each chapters should start in a new page. Each chapters along with the name of the chapters should be in capital letters and in bold. For sub topics and sub-sub topics only the first letter should be in capital and in bold.

DISTANCE AND FORMAT:

1. Each chapters should start 2.5 from above.
2. Distance between the number of the chapter and the name of the chapter are 3 lines.
3. Distance between the name of the chapter and the first line of the text are 2 lines.
4. Distance between the last lines of the text with the sub topic is 2 lines.
5. Distance between the sub topic with the first line of the text below the sub topic is 1 line.
6. No distance between paragraphs.
7. The first paragraph should not have an indent from the left, but the other paragraphs from the same topic or sub topic should have an indent of 1.27cm from the left.

TABLES IN TEXT:

Numbering should be provided for all tables. The numbering of tables is connected with the chapter. For example, if the table is the first table in Chapter 4, therefore the numbering of the table should be as Table 4.1: Description of the table (Source, year). Another example, if the table is the fifth table in Chapter 4, then the numbering of the table would be Table 4.5: Description of the table (Source, year). The numbering and description of the tables should be placed above the table.

FIGURES IN TEXT:

Numbering should be provided for all figures. Any types of diagrams, pictures, charts, graphs, are categorized as figures. Same as the numbering for tables, the numbering of the figures should be connected with the chapters as well. For example, if the figure is the first figure in Chapter 4, therefore the numbering of the figure should be as Figure 4.1: Description of the figure (Source, year). Another example, if the figure is the fifth figure in Chapter 4, then the numbering of the figure would be Figure 4.5: Description of the figure (Source, year). The numbering and description of the figures should be placed below the figure.

Sustainable Construction Technology

1.0 Course Learning Outcome

Upon completion of this course, students should be able to:

i. Compare the construction methods, materials and challenges development for civil engineering and construction activities through sustainable policies. (C5, PLO2)

ii. Integrate the knowledge of the sustainability and impact of civil engineering and construction technology work in the solution of broadly defined civil engineering problems in societal and environmental contexts. (A4, PLO6)

1.1 Introduction

Hence, as an intern engineer, you are required to examine sustainable construction technology problem and suggest a solution to overcome the problem encountered at your assignated company. A complete report need to be submitted by according to according to WBL academic calender.

1.2 Instruction

This report requires you to to identify and select type of construction technology and solution of suggested project at your company. A complete report need to be submitted according to WBL academic calender.

Task to complete:

No	Detail of Task	Note
Task 1	To meet the case study requirements, you will need to do the report individually	
Task 2	Identify the problem on sustainable construction technology problem at your company and its impact toward sustainable development: issue and problem.	(Look into 17 SD goals) BD SP1 KP SK4,SK6,SK7
Task 3	Discover how construction technology (CT) can assist them in solving the problem and promote sustainability; list and explain type of CT that available (the advantages and disadvantages)	BD SP1 KP SK4,SK6,SK7
Task 4	Identify the needs of parties involved in construction technology application (survey, literature review).	BD SP1 KP SK4,SK6,SK7
Task 5	Define the best construction technology to assist with the solving the problem (brainstorming or deal with expert) and relate it with sustainability	BD SP1,SP4 KP SK4,SK6,SK7
Task 6	Ideate the best idea using what you have define (methodology to develop the solution)	BD SP1,SP4, SP5,SP6 KP SK4,SK6,SK7
Task 7	Explain all code and regulation required in solving problem	BD SP1,SP4, SP5,SP6 KP SK4,SK6,SK7
Task 8	Justify professional engineering experiences to resolve the problem	BD SP1,SP4, SP5,SP6 KP SK4,SK6,SK7
Task 9	Produce a report according to a given format	

Technology and Innovation Management

1.0 Course Learning Outcome

Reflective Journal 1 (RJ1)

CLO1: Analyse the importance of innovation in organization. (C4, PLO6)

Reflective Journal 2 (RJ2)

CLO2: Assess an innovative project related to the industry by using the Design Thinking process. (C5, PLO3)

Presentation and Report

CLO2: Assess an innovative project related to the industry by using the Design Thinking process. (C5, PLO3)

CLO3: Develop a viable innovative project. (A4, PLO10)

1.1 Instruction

Students will need to submit the following assessments for this course accordingly:

Assessment (Nos)	Submission Date	
	No.1	No.2
Reflective Journal (2)	Week 6: WBL Monitoring 1	Week 13: Proposal Defend
Appraisal (2)	Week 6: WBL Monitoring 1	Week 16: WBL Monitoring 2
Presentation (1)	Week 16: WBL Monitoring 2	
Report (1)	Week 19	

The tasks for each of the assessments are as follows:

Reflective Journal 1 (RJ1)

RJ1 shall be due on the first WBL monitoring session.

Write on your reflection of the experiences and learning that you have gained at your work place regarding the following aspects:

i. Organizational Structure of the Company
ii. Organizational Culture of the Company
iii. Conclude your reflection with finding the gaps and best practices in the organisational learning and measures to address the gaps.

Your reflective journal (RJ1) needs to be of Arial font size 12; 1.5 spacing and a total page between 12 – 15 pages including references.

Reflective Journal 2 (RJ2)

RJ2 shall be due during proposal defend session which will be done at the polytechnic.

Write a journal on your assessment of an innovative project related to your work at the company by using the Design Thinking process as follows:

i. Empathy
ii. Define
iii. Ideate
iv. Prototype
v. Test

Conclude your journal with an ideation of a prototype for your pre-project. Your reflective journal (RJ2) needs to be of Arial font size 12; 1.5 spacing and a total page between 17 – 20 pages including references.

Presentation and Report

CLO2: Assess an innovative project related to the industry by using the Design Thinking process. (C5, PLO3)

CLO3: Develop a viable innovative project. (A4, PLO10)

Write a report on the development of your viable innovative project which you are proposing for your Final Year Project.

Your report should include:

1. Introduction
2. Literature Review
4. Innovation and Marketing
5. Lean Canvas for your Business Model
6. References

Present your Business Model Lean Canvas.

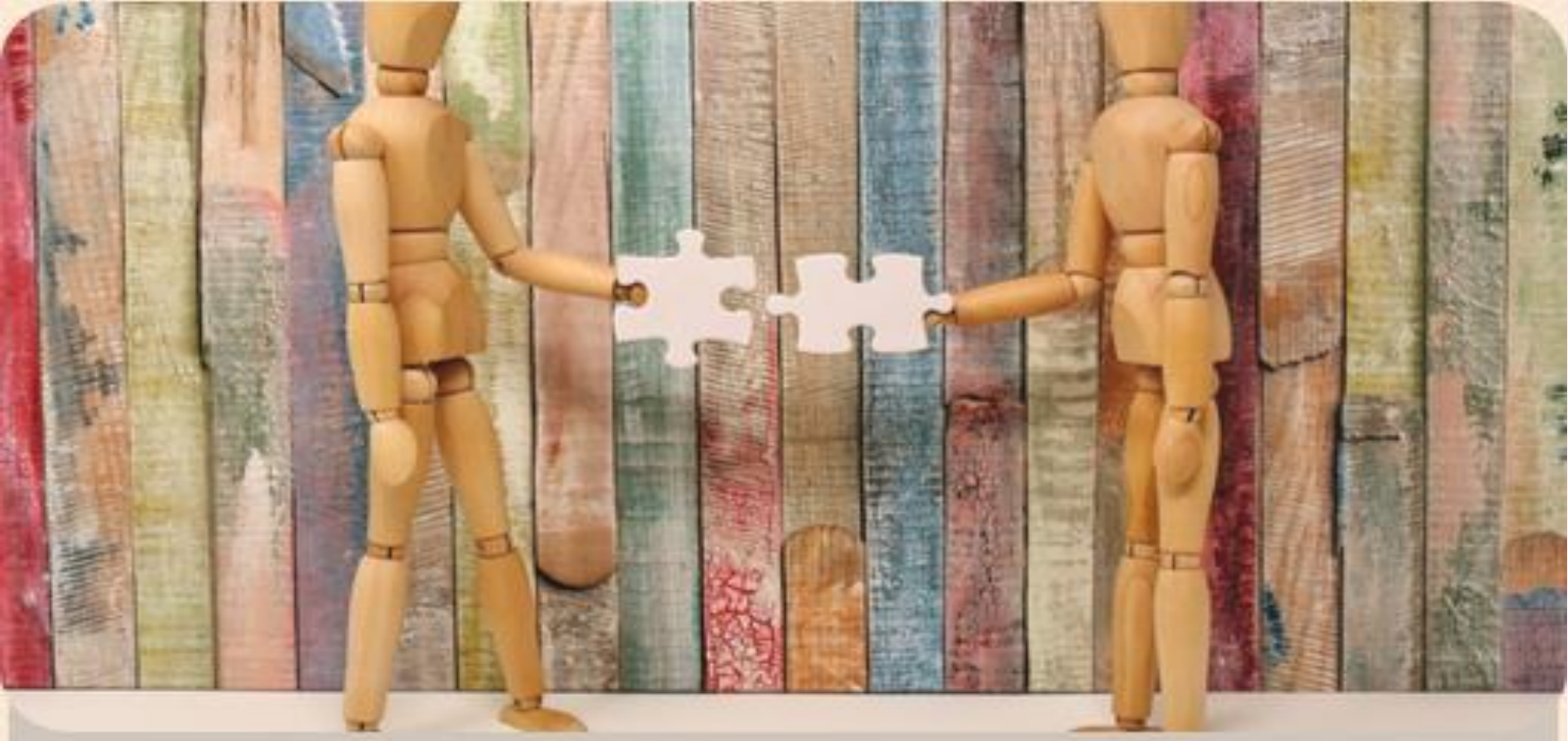
1.2 Business Model Lean Canvas

Project Name:

Date:
Iteration No:

Problem Top 3 problems	**Solution** Top 3 features	**Unique Value Proposition** Single, clear, compelling message that states why you are different and worth paying attention	**Unfair Advantage** Cannot be easily copied or bought	**Customer Segments** Target customers
	Key Metrics Key Activities you measure		**Channels** Path to customers	
Cost Structure Customer Acquisition costs Distribution costs Hosting People, etc.			**Revenue Streams** Revenue Model Life Time Value Revenue Gross Margin	

PRODUCT **MARKET**



RUBRICS

Coming together is the beginning. Keeping together is progress. Working together is success

HENRY FORD

Research Method and Pre-Project

PROJECT PROPOSAL:

PO3 Design/ development of solutions: Design solutions for broadly-defined engineering technology problems and contribute to the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations; (SK5)

CLO2 Build initiative, intellectual achievement and comprehension of the chosen subject matter and employ the theoretical principles in practical situations.

PO	CLO	SP/TA/LD	ITEM	ATTRIBUTES	RUBRIC SCALES					MARKS
					EXCELLENT	GOOD	FAIR	POOR	VERY POOR	
					5	4	3	2	1	
PO3	CLO2	SP1 Depth of knowledge required: cannot be resolved without engineering knowledge at the level of one or more of SK4, SK5, and SK6 supported by SK3 with a strong emphasis on the application of developed technology	A	Relate appropriate information with research topic using required knowledge	Ability to build (P5) a very relevant reseach topic based on the information towards providing solution using all required knowledge profiles	Ability to build a relevant reseach topic based on the information towards providing solution using all required knowledge profiles	Ability to build an acceptable reseach topic based on the information towards providing solution using all required knowledge profiles	Builds a poor reseach topic based on the information towards providing solution using some required knowledge profiles	Builds a very poor reseach topic based on the information towards providing solution using only one knowledge profile	
		SP2 Range of Conflicting Requirements: involve a variety of factors which may impose conflicting constraints	B1	Background of Study	Ability to display (P5) background of the project based on very infrequently/unfamiliar encountered issues(aspect of public health and safety, cultural, societal, environmental, sustainability laws, rules and regulations etc) using all required knowledge profiles related to the field of research towards developing problem statement.	Ability to provide background of study based on infrequently/unfamiliar encountered issues(aspect of public health and safety, cultural, societal, environmental, sustainability etc) using the all required knowledge profiles related to the field of research towards developing problem statement.	Ability to provide background of study based on several infrequently/unfamiliar encountered issues(aspect of public health and safety, cultural, societal, environmental, sustainability etc) using the required all knowledge profiles related to the field of research towards developing problem statement.	Ability to provide background of study based on frequently/familiar encountered issues(aspect of public health and safety, cultural, societal, environmental, sustainability etc) using the some required knowledge profiles related to the field of research towards developing problem statement.	Ability to provide background of study based on frequently/familiar encountered issues(aspect of public health and safety, cultural, societal, environmental, sustainability etc) using only one knowledge profile related to the field of research towards developing problem statement.	
			B2		Ability to measure (P5) by comparing more than two(2) identified issues which are exerting conflicting constraints/requirements/needs.	Ability to measure by comparing two(2) identified issues which are exerting conflicting constraints/requirements/needs.	Ability to measure moderately by comparing two(2) identified issues which are exerting conflicting constraints/requirements/nees.	Ability to measure poorly with only one issue where there is no comparison to be done.	There is NO issue measured.	
		SP4 Familiarity of issues: belong to families of familiar problems which are solved in well-accepted ways	C	Development of Problem Statement	Ability to construct (P5) very relevant problem statement based on current situation(previous study/similar work), infrequently encountered issues/problem with the current situation and what need to be done.	Ability to construct a relevant problem statement based on current situation(previous study/similar work), infrequently encountered issues/problem with the current situation and what need to be done.	Ability to construct an acceptable problem statement based on current situation(previous study/similar work), infrequently encountered issues/problem with the current situation and what need to be done.	Constructs problem statement based on current situation(previous study/similar work), but lacks to relate with infrequently encountered issues/problem with the current situation and what need to be done.	Constructs problem statement very poorly based on current situation(previous study/similar work), does not relate to any encountered issues/problem with the current situation and what need to be done.	
			D	Development of Objectives	Ability to organize (P5) very relevant objectives that are SMART(Specific, Measurable, Achievable, Realistic and Timeliness) based on related information and problem statement.	Ability to organize a relevant objectives that are SMART(Specific, Measurable, Achievable, Realistic and Timeliness) based on related related information and problem statement.	Ability to organize acceptable objectives that are SMART(Specific, Measurable, Achievable, Realistic and Timeliness) based on related related information and problem statement.	Organizes objectives that lacks to meet with the SMART(Specific, Measurable, Achievable, Realistic and Timeliness) concept where they stray slightly from related information and problem statement.	Organizes objectives poorly where they are not based on related information and problem statement.	

PO	CLO	SP/TA/LD	ITEM	ATTRIBUTES	RUBRIC SCALES					MARKS
					EXCELLENT	GOOD	FAIR	POOR	VERY POOR	
					5	4	3	2	1	
PO3	CLO2	**SP2 Range of Conflicting Requirements: involve a variety of factors which may impose conflicting constraints**	**E**	**Establish Scope of Study**	Ability to demonstrate (P5) a comprehensive scope of study with consideration of conflict/issues, resources(materials/machine/ manpower/money), research setting and methods.	Ability to demonstrate a good scope of study with consideration of conflict/issues, resources(materials/machine/ manpower/money), research setting and methods.	Ability to demonstrate an acceptable scope of study with consideration of conflict/issues, resources(materials/machine/ manpower/money), research setting and methods.	Ability to demonstrate scope of study with some consideration of conflict/issues, resources(materials/machine/ manpower/money), research setting and methods.	Ability to demonstrate a very poor scope of study with only one consideration of conflict/issues, resources(materials/machine/ manpower/money), research setting and methods.	
		SP1 Depth of knowledge required: cannot be resolved without engineering knowledge at the level of one or more of SK4, SK5, and SK6 supported by SK3 with a strong emphasis on the application of developed technology	**F**	**Literature Review**	Ability to construct (P5) a systematic literature review to integrate findings from previous study and relate to current study, includes very relevant citations/references with materials organised according to themes	Ability to construct a good literature review to integrate findings from previous study and relate to current study, includes relevant citations/references with materials organised according to themes	Ability to construct an acceptable literature review to integrate findings from previous study and relate to current study, includes some relevant citations/references with materials organised according to themes	Constructs a literature review but lacks to integrate findings from previous study and relate to current study, include few relevant citations/references with materials organised according to themes	Construct a very poor literature review where there is no connection shown on the findings from previous study and current study, includes irrelevant citations/references with materials organised according to themes	
		SP5 Extent of applicable codes: may be partially outside those encompassed by standards or codes of practice	**G**	**Methodology**	Ability to organize (P5) and sketch (P5) a systematic methodology framework/component that is consistent with the objectives and adopts relevant codes and standards of practice, methods of data collections and proposed activities using gantt chart.	Ability to organize and sketch a good methodology framework/component that is consistent with the objectives and adopts relevant codes and standards of practice, methods of data collections and proposed activities using gantt chart.	Ability to organize and sketch an acceptable methodology framework/component that is consistent with the objectives and adopts relevant codes and standards of practice, methods of data collections and proposed activities using gantt chart.	Ability to organize and sketch a methodology framework/component which lacks to be consistent with the objectives, adopts some relevant codes and standards of practice, methods of data collections and proposed activities using gantt chart.	Organizes and sketches a poor methodology framework/component which is not consistent with the objectives and adopts irrelevant codes and standard methods, data collections and planning of proposed activities using gantt chart.	
		SP6 Extent of stakeholder: involvement & conflicting requirements: involve several groups of stakeholders with differing and occasionally conflicting needs	**H**	**Expected Outcomes**	Ability to construct (P5) a comprehensive expected outcomes/preliminary study which are very consistent with objectives and proposed methodology, which coordinates well with differing and occasionally conflicting needs of the stakeholders.	Ability to construct a good expected outcomes/preliminary study which are very consistent with objectives and proposed methodology, which coordinates well with differing and occasionally conflicting needs of the stakeholders.	Ability to construct an acceptable expected outcomes/preliminary study which are very consistent with objectives and proposed methodology, which coordinates well with differing and occasionally conflicting needs of the stakeholders.	Ability to construct an expected outcomes/preliminary study which lacks of consistency with objectives and proposed methodology, which also lacks to coordinates well with differing and occasionally conflicting needs of the stakeholders.	Ability to construct a poor expected outcomes/preliminary study which are inconsistent with objectives and proposed methodology.	
TOTAL MARKS										
OVERALL MARKS = TOTAL MARKS/45*20										

PO10 **Communication : Communicate effectively on broadly-defined engineering activities with the engineering community and with society at large, by being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.**

CLO4 **Produce project proposal based on knowledge and analysis in broadly-defined civil engineering problems.**

PO	CLO	SP/TA/LD	ITEM	ATTRIBUTES	RUBRIC SCALES					MARKS
					EXCELLENT	GOOD	FAIR	WEAK	POOR	
					5	4	3	2	1	
PO10	CLO4	TA1 Range of resources: involve a variety of resources (and for this purposes resources includes people, money, equipment, materials, information and technologies)	A	Organizational of Report & Sequence of Contents	Well written (C6) proposal that demonstrates a well organized content supported with ideas and understandable sequence according to the standard of report.	Good written proposal that demonstratesa a well organized content supported with ideas and understandable sequence according to the standard of report.	Fair written proposal that demonstrates a fairly organized content supported with ideas and understandable sequence according to the standard of report.	Poor written proposal that demonstrates a poorly organized content supported with ideas and understandable sequence according to the standard of report.	Unable to write a proposal that demonstrates an organized content supported with ideas and understandable sequence according to the standard of report.	
			B		All of the contents of the proposal is well combined (C6) with appropriate investigation design process task and other information justifies (C6) the research topic as well.	Most of the contents of the proposal is combined with investigation design process task and other information justifies the research topic as well	Sufficient contents of the proposal are combined with investigation design process task and other information justifies to the research topic as well	The contents of the proposal lacks to combine with the investigation design process task and other information lacks to justify the research topic as well	Contents of the proposal is not combined with investigation design process task and the other information does not justifies to the research topic as well	
			C		Ability to develop (C6) a proposal that follows all required format (title, table of contents, summary, introduction, literature review, methodolody, expected outcome and references). Ability to write (C6) as according to the required reference format (APA/IEEE etc.).	Ability to develop a proposal that almost follows the required format (title, table of contents, summary, introduction, literature review, methodolody, expected outcome and references). Ability to write as according to the required reference format (APA/IEEE etc.).	Ability to develop a proposal that follows the required format moderately as according to the required report format(title, table of contents, summary, introduction, literature review, methodolody, expected outcome and references). Ability to write as according to the required reference format (APA/IEEE etc.) moderately as well.	Develops a proposal that lacks to follow the required report format(title, table of contents, summary, introduction, literature review, methodolody, expected outcome and references). Lacks to write as according to the required reference format(APA/IEEE etc.) as well. Needs revision.	Unable to develop a proposal that follows the required report format(title, table of contents, summary, introduction, literature review, methodolody, expected outcome and references), and unable to write as well as according to the the required reference format(APA/IEEE etc.). Needs major revision.	
			D		Able to organize and integrate (C6) twenty (20) information from variety of sources to realise a specific purpose from the intended project.	Able to organize and integrate fifteen (15) information from variety of sources to realise a specific purpose from the intended project.	Able to organize and integrate ten (10) information from variety of sources to realise a specific purpose from the intended project.	Able to organize and integrate less than ten (10) information from variety of sources to realise a specific purpose from the intended project.	Unable to organize and integrate information from variety of sources to realise a specific purpose from the intended project..	
		TA2 Level of interactions: require resolution of occasional interactions between technical, engineering and other issues, of which few are conflicting	E	Objectives	Creates (C6) very relevant issue(s), research and information for problem statement, objective, and scope of research/project.	Creates relevant issue(s), research and information for problem statement, objective, and scope of research/project.	Creates acceptable issue(s), research and information for problem statement, objective, and scope of research/project.	Creates uncertain issue(s), research and information for problem statement, objective, scope of research/project.	Creates irrelevant issue(s), research and information for problem statement, objective, scope of research/project.	
			F	Literature Review	Reports (C6) an outstanding technical and engineering issues based on critical review of the topic in defining the objective and limitation of the research/project.	Reports a good indication technical and engineering issues based on critical review of the topic in defining the objective and limitation of the research/project.	Reports an adequate technical and engineering issues based on critical review of the topic in defining the objective and limitation of the research/project.	Reports a weak technical and engineering issues based on critical review of the topic in defining the objective and limitation of the research/project.	Unable to report technical and engineering issues based on critical review of the topic in defining the objective and limitation of the research/project.	
		TA3 Innovation: involve the use of new materials, techniques or processes in non-standard ways	G	Methods and materials	The proposed (C6) methodology flow/process expresses (C6) an excellent innovative or modified solution procedure/technique.	The proposed methodology flow/process expresses a good innovative or modified solution procedure/technique.	The proposed methodology flow/process expresses an acceptable innovative or modified solution procedure/technique.	The proposed methodology flow/process expresses poor innovative or modified solution procedure/technique.	The proposed methodology flow/process is unable to expresses a logical and clear innovative or modified solution procedure/technique.	
TOTAL MARKS										
OVERALL MARKS = TOTAL MARKS/45*20										

Sustainable Construction Technology

MAPPING PO VS SP SK

PO		SP1								SP2	SP3	SP4	SP5	SP6	SP7
		SK1	SK2	SK3	SK4	SK5	SK6	SK7	SK8						
PO5 - Modern Tool Usage	Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to **broadly-defined engineering problems**, with an understanding of the limitations. **(SK6)**				X		X					X	X		
PO7 -Environment and Sustainability	Understand the impact of engineering technology solutions **of broadly defined engineering problems** in societal and environmental context and demonstrate knowledge of and need for sustainable development. **(SK7)**							X				X		X	

MAPPING ASSESSMENT VS SK SP

Type of Assignment	CLO	PO	SP	SK
Report	1,3	5,7	1,4,5	4,6,7

ASSESSMENT RUBRIC

This project comprises 20% the marks weighting for this course.

PO5

SP	Characteristic	Rubrics Design Knowledge	Task	1	2	3	4	5
SP1	**Depth of Knowledge**	Analyse the problem using specified knowledge profile	Task 2-6	Ability to Ideate the best idea to overcome problem				
				Student able to analyse the problem using 1 specified knowledge profile	Student able to analyse the problem using 1 specified knowledge profile with some elaboration	Student able to analyse the problem using 2 specified knowledge profile with acceptable elaboration	Student able to analyse the problem using 3 specified knowledge profile with good elaboration	Student able to analyse the problem using 3 specified knowledge profile with excellent elaboration
		Evaluate the problem under such circumstance towards providing an effective solution		Ability to define the best construction technology to assist with the project				
				Evaluate 1 construction technology can overcome the problem	Evaluate 2 construction technology can overcome the problem with some elaboration	Evaluate 2 construction technology can overcome the problem with acceptable elaboration	Evaluate 3 construction technology can overcome the problem with good elaboration	Evaluate more than 3 construction technology can overcome the problem with excellent elaboration
SP4	**Familiarity of issues**	Differentiate the infrequently encountered issues in problem solving	Task 5-9	Ability to differentiate the needs of all parties involved				
				Compare the basis.	Compare and differentiate 2 issues	Differentiate 2 issues and propose	3	>3
		Select formulae/procedures to resolve the infrequently encountered issues		Ability to Ideate the best approaches to solve the issue				
				Select an approach to resolve.	Select 2 approaches to resolve	Select 2 approaches to resolve and justify	3	>3
SP5	**Extent of applicable codes**	Develop solution using standards and codes of practice for professional engineering	Task 6-9	Ability to include code and regulation required				
				Use at least 1	Use at least 2	Use at least 2 and include practising guide	3	>3
		Justify professional engineering experiences to resolve the problem solving		Ability to justify professional engineering experiences to resolve the problem solving				
				Justify using at least 1 experience	Justify using at least 2 experiences	Justify using 2 experiences and select at least 1	3	>3

PO 7

SP	Characteristic	Rubrics Design Knoeledge	Task	1	2	3	4	5
SP1	Depth of Knowledge	Analyse the problem using specified knowledge profile	Task 2-6	Ability to Identify the problem and the impact toward sustainability				
				Student able to analyse the problem using 1 specified knowledge profile	Student able to analyse the problem using 1 specified knowledge profile with some eloboration	Student able to analyse the problem using 2 specified knowledge profile with acceptable eloboration	Student able to analyse the problem using 3 specified knowledge profile with good eloboration	Student able to analyse the problem using 3 specified knowledge profile with excellent eloboration
		Evaluate the problem under such circumstance towards providing an effective solution		Ability to evaluate problem and relate it with sustainability				
				Evaluate 1 construction technology can overcome the issue and link to sustainability	Evaluate 2 construction technology can overcome the issue and link to sustainability with some eloboration	Evaluate 2 construction technology can overcome the issue and link to sustainability with acceptable eloboration	Evaluate 3 construction technology can overcome the issue and link to sustainability with good eloboration	Evaluate more than 3 construction technology can overcome the issue and link to sustainability with excellent eloboration
SP4	Familiarity of issues	Differentiate the infrequently encountered issues in problem solving	Task 5-9	Ability to Discover how construction technology (CT) can assist the sustaianable development				
				Compare the basis.	Compare and differentiate 2 issues	Differentiate 2 issues and propose	3	>3
		Select formulae/procedures to resolve the infrequently encountered issues		Ability to ideate the best solution using several approach				
				Select an approach to resolve.	Select 2 approaches to resolve	Select 2 approaches to resolve and justify	3	>3
SP6	Extent of stakeholder involvement & conflicting requirements	Differentiate the diverse groups of stakeholders with widely varying needs.	Task 2-9	Ability to do compare parties need				
				Compare the basis.	Compare and differentiate 2 groups	Differentiate 2 groups and propose 1 solution	3	>3
		Select stakeholder interests and requirements that give impact on the problem		Ability to select and ideate best solution based on stakeholder interest				
				Select a stakeholder and discuss impact.	*Select 2 stakeholders and compare impacts.*	*Select 2 stakeholders and justify impacts.*	*3*	*>3*

COURSE		BCT7275 - TECHNOLOGY & INNOVATION MANAGEMENT				
ASSESSMENT		REPORT & PRESENTATION (50%)				
CLO1 - LD 4 CRITICAL THINKING AND PROBLEM SOLVING SKILLS	Aspects	Excellent 4	Good 3	Fair 2	Unsatisfactory 1	Score
	A. Inquire : Identify and Define Key Issue/s and/or Problem/s	Clearly, accurately and appropriately identifies key issues/s and/or problem/s	Identifies most or all key issue/s and/or problem/s	Identifies some or all key issue/s and/or problem/s. May have some inaccuracies, omissions or errors present that interfere with meaning.	Most or all of key issue/s and/or problem/s are not identified or defined, or are identified or defined inaccurately (unclear).	
	B. Analyse: Present and Analyse Data / Information	Present appropriate, sufficient and credible data/information. Clear analyses information for accuracy, relevance and validity. Information clearly relates to meaning.	Present sufficient and appropriate data/information. Generally analyses data/information for accuracy, relevance and validity. Minor inaccuracies or omissions do not interfere with analysis of meaning.	Presents some appropriate data/information. May miss of ignore relevant data/information. Analysis is limited or somewhat inappropriate. May contain inaccuracies or omissions that interfere with analysis and/or meaning.	Does not present relevant and appropriate data/information. Fails to analyse or uses inaccurate or inappropriate analysis of data/information. Copies information without analysis.	
	C. Evaluate : Apply a Multi-Dimensional Approach/Consider Context	Clearly applies a multi-dimensional approach. Synthesizes various perspectives. Acknowledge limit of position or context.	Acknowledges multiple approaches. Some synthesis of perspectives. May not fully acknowledge limits of position or context, but is aware of limits or context.	Somewhat simplifies position with some sense of multiple approaches. Minor or vague synthesis of perspectives. Some acknowledgement position may have limit and may not acknowledge context.	Student's position is grounded in a singular, often personal perspective. Position may be simplistic and obvious. Little or no awareness that position may have limits or context.	
	D. Solve: Demonstrate Sound Reasoning and Conclusions	Reasoning is logical and creative, consistent, complete and often unique. Conclusion is complex and/or detailed, well supported, creative, complete and relevant.	Reasoning is mostly logical, complete and consistent. Demonstrates some unique or creative insight. Conclusion is generally complete, supported and mostly consistent and relevant.	Reasoning contains elements of logic and/or creative insight, but not fully resolved. May have minor inconsistencies or omissions. Conclusion is relevant but abbreviated or simplified, not fully supported and /or contains minor inconsistencies.	Reasoning is illogical, simplistic, and inconsistent or absent. Conclusion is simplistic and stated as an absolute, or inconsistent with evidence or reasoning. Lack of coherent or clear conclusion.	
					TOTAL SCORE FOR CLO 1	**/16**

CLO 2 - LD 1 KNOWLEDGE	**A. Generates ideas**	Clear evidence of multiple ideas generated.	Some evidence of ideas generated.	Lack evidence of ideas generated.	No evidence of ideas generated.	
	B. Analyze relationships	Demonstrates ability to identify the main pattern running through all information given along with minor patterns.	Demonstrates ability to identify the main pattern running through all information given.	Demonstrates ability to identify the main pattern running through few information given.	Does not address the main pattern running through the information given.	
	C. Compare and contrast various ideas	Uses specific inductive or deductive reasoning to make inferences regarding premises, identifies facts and relevant information correctly, addresses implications and consequences.	Uses apparent reasoning to make inferences regarding solutions. Shows some confusion regarding facts, opinions, evidence, data or information.	Uses superficial reasoning to make inferences regarding solutions. Shows confusion regarding facts, opinions, evidence, data or information.	Does not select or defend a solution	
					TOTAL SCORE FOR CLO 2	**/12**
CLO3-LD7 MANAGEMENT AND ENTREPRENEURIAL SKILLS	**A.Information Literacy**	Demonstrates ability to explain, organize and evaluate the quality and relevance of information from multiple sources	Usually able to explain, organize and evaluate the quality and relevance of information from multiple sources	Has difficulty to explain, organize and evaluate the quality and relevance of information from multiple sources	Unable to explain, organize and evaluate the quality and relevance of information from multiple sources	
	B. Adaptability & Flexibility	Easily make changes in the environment that require adaptation or flexibility and helps others explore ways to adapt or be flexible to better achieve an intended outcome	Notices changes in the environment that require adaptation or flexibility and help others explore ways to adapt or be flexible to better achieve an intended outcome.	Makes an effort to adapt to unfamiliar change in the environment and / or tries to be more flexible with encouragement and when the need is pointed out	Makes no effort to adapt to unfamiliar change in the environment and / or tries to be more flexible with encouragement and when the need is pointed out	
	C. Collaboration	Models behaviours, including sensitivity to cultural, generational, and personality differences, that promote collaboration and working productively	Works well as a team member when roles and goals are clearly defined. Sometimes able to negotiate conflict to achieve an intended result	Comfortable working with friends or like-minded individuals from similar backgrounds. Has difficult time negotiating conflicts	Uncomfortable working with friends or like-minded individuals from similar backgrounds. Unable to negotiate conflicts	
					TOTAL SCORE FOR CLO 3	**/12**
					TOTAL SCORE = CLO1 + CLO2 + CLO3	**/40**
					TOTAL STUDENT'S SCORE = /40 X 50%	

COURSE		BCT7275 - TECHNOLOGY & INNOVATION MANAGEMENT				
ASSESSMENT		REPORT & PRESENTATION (50%)				
CLO1 - LD 4 CRITICAL THINKING AND PROBLEM SOLVING SKILLS	Aspects	Excellent 4	Good 3	Fair 2	Unsatisfactory 1	Score
	A. Inquire : Identify and Define Key Issue/s and/or Problem/s	Clearly, accurately and appropriately identifies key issues/s and/or problem/s	Identifies most or all key issue/s and/or problem/s	Identifies some or all key issue/s and/or problem/s. May have some inaccuracies, omissions or errors present that interfere with meaning.	Most or all of key issue/s and/or problem/s are not identified or defined, or are identified or defined inaccurately (unclear).	
	B. Analyse: Present and Analyse Data / Information	Present appropriate, sufficient and credible data/information. Clear analyses information for accuracy, relevance and validity. Information clearly relates to meaning.	Present sufficient and appropriate data/information. Generally analyses data/information for accuracy, relevance and validity. Minor inaccuracies or omissions do not interfere with analysis of meaning.	Presents some appropriate data/information. May miss of ignore relevant data/information. Analysis is limited or somewhat inappropriate. May contain inaccuracies or omissions that interfere with analysis and/or meaning.	Does not present relevant and appropriate data/information. Fails to analyse or uses inaccurate or inappropriate analysis of data/information. Copies information without analysis.	
	C. Evaluate : Apply a Multi Dimensional Approach/Consider Context	Clearly applies a multi-dimensional approach. Synthesizes various perspectives. Acknowledge limit of position or context.	Acknowledges multiple approaches. Some synthesis of perspectives. May not fully acknowledge limits of position or context, but is aware of limits or context.	Somewhat simplifies position with some sense of multiple approaches. Minor or vague synthesis of perspectives. Some acknowledgement position may have limit and may not acknowledge context.	Student's position is grounded in a singular, often personal perspective. Position may be simplistic and obvious. Little or no awareness that position may have limits or context.	
	D. Solve: Demonstrate Sound Reasoning and Conclusions	Reasoning is logical and creative, consistent, complete and often unique. Conclusion is complex and/or detailed, well supported, creative, complete and relevant.	Reasoning is mostly logical, complete and consistent. Demonstrates some unique or creative insight. Conclusion is generally complete, supported and mostly consistent and relevant.	Reasoning contains elements of logic and/or creative insight, but not fully resolved. May have minor inconsistencies or omissions. Conclusion is relevant but abbreviated or simplified, not fully supported and /or contains minor inconsistencies.	Reasoning is illogical, simplistic, and inconsistent or absent. Conclusion is simplistic and stated as an absolute, or inconsistent with evidence or reasoning. Lack of coherent or clear conclusion.	
					TOTAL SCORE FOR CLO 1	**/16**

CLO 2 - LD 1 KNOWLEDGE	**A. Generates ideas**	Clear evidence of multiple ideas generated.	Some evidence of ideas generated.	Lack evidence of ideas generated.	No evidence of ideas generated.	
	B. Analyze relationships	Demonstrates ability to identify the main pattern running through all information given along with minor patterns.	Demonstrates ability to identify the main pattern running through all information given.	Demonstrates ability to identify the main pattern running through few information given.	Does not address the main pattern running through the information given.	
	C. Compare and contrast various ideas	Uses specific inductive or deductive reasoning to make inferences regarding premises, identifies facts and relevant information correctly, addresses implications and consequences.	Uses apparent reasoning to make inferences regarding solutions. Shows some confusion regarding facts, opinions, evidence, data or information.	Uses superficial reasoning to make inferences regarding solutions. Shows confusion regarding facts, opinions, evidence, data or information.	Does not select or defend a solution	
					TOTAL SCORE FOR CLO 2	**/12**
CLO3-LD7 MANAGEMENT AND ENTREPRENEURIAL SKILLS	**A.Information Literacy**	Demonstrates ability to explain, organize and evaluate the quality and relevance of information from multiple sources	Usually able to explain, organize and evaluate the quality and relevance of information from multiple sources	Has difficulty to explain, organize and evaluate the quality and relevance of information from multiple sources	Unable to explain, organize and evaluate the quality and relevance of information from multiple sources	
	B. Adaptability & Flexibility	Easily make changes in the environment that require adaptation or flexibility and helps others explore ways to adapt or be flexible to better achieve an intended outcome	Notices changes in the environment that require adaptation or flexibility and help others explore ways to adapt or be flexible to better achieve an intended outcome.	Makes an effort to adapt to unfamiliar change in the environment and / or tries to be more flexible with encouragement and when the need is pointed out	Makes no effort to adapt to unfamiliar change in the environment and / or tries to be more flexible with encouragement and when the need is pointed out	
	C. Collaboration	Models behaviours, including sensitivity to cultural, generational, and personality differences, that promote collaboration and working productively	Works well as a team member when roles and goals are clearly defined. Sometimes able to negotiate conflict to achieve an intended result	Comfortable working with friends or like-minded individuals from similar backgrounds. Has difficult time negotiating conflicts	Uncomfortable working with friends or like-minded individuals from similar backgrounds. Unable to negotiate conflicts	
					TOTAL SCORE FOR CLO 3	**/12**
					TOTAL SCORE = CLO1 + CLO2 + CLO3	**/40**
					TOTAL STUDENT'S SCORE = /40 X 50%	