**A Major Project Report on**

**YourProject Title {18 Point Title Case Bold}**

Submitted as a partial fulfillment of requirements of

The degree of Bachelor of …. {Your program name} Engineering under

Pokhara University

**Submitted By:**

1. Name: Exam Roll:
2. Name: Exam Roll:
3. Name: Exam Roll:
4. Name: Exam Roll:

**Under the Supervision**

………………..{ Full Name of Faculty}

………………….{ Department/Office}



**Month Year**

# CERTIFICATE OF APPROVAL

{You will be provided this certificate by examination section from college and should be placed here}

# COVER LETTER

Date: DD:MM:YYYY

To

The Project Supervisor,

Department of ……………………………..

Oxford College of Engineering and Management

**SUBJECT: Cover Letter for project approval**

Dear Sir/Madam,

Submitted for your review is our project entitled “**(Replace with Project Name)**.” The report is submitted as requirement of course entitled **Project …. . … {Subject name with subject code}**. Within this document you will find the basic introductions, objectives, methodology and expected outcome from the proposed work (Listed in detail in the table of content section).

We hope for your keen review and future assistance in this work along with the approval.

Sincerely,

(Group Members name and exam roll number in alphabetical order of first name, bold)

**\*Samir Raj Bhandari (12345678)**

# SUPERVISOR'S RECOMMENDATION

I hereby recommend that this project prepared under my supervision entitled **“(Replace with Project Name).”** for partial fulfillment of the requirements for the degree of Bachelor in Electrical and Electronic Engineering to processed for the evaluation.

..............................

**“Replace Name of Your Supervisor”**

SUPERVISOR

# DEPARTMENTAL ACCEPTANCE

The project entitled “**(Replace with Project Name)**.” submitted by **“Group Member’s Name”** for the partial fulfillment of the requirement of the degree in ''Bachelor of Electrical and Electronic Engineering '' has been accepted as authentic and original work.

............................

**“Replace with the Name of HoD”**

Head of Department

Electrical and Electronic of Engineering

Oxford College of Engineering and Management

Gaidakot-02, Nawalpur

Nepal

# ACKNOWLEDGEMENT

We would like to express our sincere gratitude to our …………………………………… our Project Supervisor …………………….and to all the Faculties of………………………., Oxford College of Engineering and Managementfor giving and opportunity to work on this topic. It would never be possible for us to take this project to this level without their innovative ideas and their relentless support and encouragement.

Acknowledge professors, supervisor, authors, researchers and others without which the completion and compilation of the project and report would not have been possible within two short paragraphs.

(Group Members name and exam roll number in alphabetical order of first name, bold)

**\*Samir Raj Bhandari (12345678)**

# ABSTRACT

Micro-hydro power plants (MHPs) are generally standalone power plants that utilize the gravitational potential energy of water to generate electricity through necessary conversion process. MHPs are used when the grid extension is not possible to the rural areas. They don’t require continuous maintenance also cost of running and transmission is low. These types of plants are very efficient in the context of Nepal. An ELC is a solid-state electronic device designed to regulate output power of generator used in the MHPs.

Try to keep the abstract short and sweet, explaining the main idea and outcome of the project with in few paragraphs and not more than a page.

Note: Don’t put citation in the abstract section.

**Keywords:** Data logger, ELC, Frequency measurement, Micro hydro power plants.

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# LIST OF ABBREVIATIONS

|  |  |
| --- | --- |
| ELC | Electronic Load Controller |
| LCD | Liquid Crystal Display |
| MHPs | Micro-Hydro Projects |
| SHEB | Small Hydro Electric Board |

# LIST OF SYMBOLS

|  |  |  |
| --- | --- | --- |
| H | Effective pressure head | [m] |
| P | Mechanical power produced at the turbine shaft | [W] |
| Qf | Flow Rate | [m3/s] |
| g | Acceleration due to gravity | [m/s2] |
| ρ | Density of the water | [m3/kg] |
| f | Frequency | [Hz] |
| p | Number of Poles of the Generator | - |
| C | Output Coefficient [1.1 π2 Bav ac Kw × 10-3] | - |
| D2L | Volume of the active parts | [m3] |
| D | Stator Bore | [m] |
| L | Stator Core Length | [m] |
| Ns | Synchronous speed | [rpm] |

# CHAPTER 1: INTRODUCTION

## Background

Micro-hydro are emerging means of power supply which is an economic alternative to the national grid as they tend to reduce the high cost of extending grid [1]. The establishment of SHEB in 1975 opened the door for developing small hydro projects in the district center of the mountainous parts of Nepal [2]. The figure below shows the typical Micro-Hydro system incorporating an ELC [1].



**Figure 1:** Typical Micro-hydro system with ELC.

Chapter Heading: Capital Case, 16 pts, bold. Use line spacing of 1.5 between sub chapters, lines and paragraph. The line spacing should be precisely 1.5. Use Times New Roman as your standard font in the entire report

Sub headings: 14 pts, bold.

For further sub headings use, 12 point, bold

Use 12 point for literature.

For figures use center align with caption below each figure.

In this background section students shall discuss the historical background and related work done regarding their project work along with the introduction of the topic in brief.

## Problem Statement

In this section students are requested to clearly state the major reason for undertaking this project.

## Objectives

The objective of this study is to identify the adaptive electronic strategies to address the varying load demand during a day in micro-hydropower sector of Nepal.

### Specific Objective:

To design a load controller that could balance excess power in the power house by regulating the dump loads.

### General Objective:

1. a. To maintain the system frequency at 50 Hz with 5% tolerance.
2. b. To maintain the system voltage at 220 V.
3. c. To display the readings from different sensors into LCD.
4. d. To store the readings from the sensors into a Storage Device for future analysis.
5. In the objective section the students shall explain sets of objectives as-
6. 1. Exact specific objectives achieved at the end of the project and
7. 2. General objective that is automatically attained during the work to address the specific objective.

## Scope of the Project

Discuss the relevance and the underlying problems of your project/work in the scope section.

**Table 1:** System Scope of the Project

|  |  |
| --- | --- |
| . **Parameter** | **Rating** |
| Voltage  | 220V  |
| Current  | 5A  |
| Power  | 1 KW  |
| Frequency  | 50 Hz  |

For table use center align with caption at the top of each table.

## Research Methodology

In this section students shall briefly explain the methodology of their respective project.

## Limitations

Firstly, we thought of regulating the voltage as advantages to voltage regulation is regulating the ELC to right voltage is much accurate. The voltage can be set when the ELC is made so it does not need to be changed again at the consumer side.

However, it had some limitations as follows:

1. Many alternators regulate the voltage by changing the excitation current, such as the brush-fewer alternators. This requires the frequency to be regulated.

2. Frequency regulation is easier. The fastest regulation must always be based on frequency; otherwise, the system can be unstable.

3. Frequency regulation is necessary if alternators are synchronized.

Elaborate the possible limitations of the project in this section.

## Chapter Organization

In this section students are requested to briefly describe the content of different chapters.

# CHAPTER 2: LITERATURE REVIEW

## 2.1 Current Sensor (ASC 712)

The Allegro ACS712 provides economical and precise solutions for AC or DC current sensing in industrial, commercial, and communications systems. The device package allows for easy implementation by the customer. Typical applications include motor control, load detection and management, switched-mode power supplies, and overcurrent fault protection [3].

In these section studentsshould address the current knowledge including substantive findings, as well as theoretical as well as methodological contributions of different authors, scientists, researchers and sources. It is a secondary source so may not include new or original work of student.

Students are requested to cite the name of the source that they use for their project.

# CHAPTER 3: METHODOLOGY

## 3.1 Theoretical Framework

The variation in terminal voltage and frequency is due to the imbalance in the power generated by generator and power absorbed by the load. This variation can cause serious damage to the consumer loads. Hence there is requirement of a controller to regulate the terminal voltage and frequency of the generated power by balancing the real and reactive power produced and absorbed. The controller must be able to divert the extra power to the alternative load which is not absorbed by the consumer load. The synchronous speed of a generator is greatly dependent on the frequency of the system [4].

$$Synchronous speed (Ns)=\frac{120f}{p}$$

In this project an ELC is used as a controller dump loads connected in parallel with the consumer load connected to synchronous generator. This ELC used consists of resistive elements as dump loads.

The output equation of a A.C. machine or kVA rating of machine is given by [4];

$$kVA rating of a machine=C D2 L Ns kVA$$

Students should describe the theoretical principle behind the whole work relative to the project. The students must keep in mind that the choice of the project topic was not done at random but through a careful and sound literature review.



**Figure 2:** Flowchart of the ELC System

## 3.2 Study Design

First, a synchronous generator and an alternator set would be used as a model for a micro hydro turbine and generator set. The output from the set would be used to supply the consumer load. The same power after necessary step down, rectification and regulation will be used to power the microcontroller.

In the study design student shall list or create a block diagram incorporating the activities that needs to be performed during the entire work period.



**Figure 3:** Block Diagram of the Study Design

## 3.3 Simulation and Results

In this section students shall explain outcomes and designs of their projects in a chronological order eradicating ambiguity.

## 3.4 Gantt Chart/Work Schedule/ Activity Plan

In this section the author shall create an estimation of activity along with time line on weekly basis. This chart though liable for deviation should look realistic and contain all the needed activity.

**Table 2**: Gantt chart



# CHAPTER 4: ANALYSIS AND OUTCOME

## 4.1 Software

## 4.2 Input / Output Variable

## 4.3 Models

## 4.4 ………

From this project, it is observed the following output:

1. Maintain constant frequency/voltage from the load side of the system by constantly measuring the frequency/voltage, instantly recognizing load variations, and then **automatically activating the dump loads** as required to match the difference between input power from the generator and the output power to the user loads.
2. **Use minimal components** with no moving parts to reduce the amount of maintenance.
3. Be relatively easy to install, avoiding the need for specialist personnel and equipment.

Here, the students may include the outcome of the overall project/work with possible figures and facts.

# CHAPTER 5: BUDGET

In this section the student shall list the tentative materials, the dimensions or units of materials along with the unit cost and overall costs in a tabular form.

# CHAPTER 6: CONCLUSION AND RECOMMENDATION

## 5.1 Assumptions

## 5.2 Tables/ graphs

## 5.3 Findings

## 5.4 …………..

Justify your texts so that the texts are equally aligned at both left and right margins. Do not give any space between the consecutive paragraphs within a sub topic. However, when you change topic within a chapter, give a space after the last paragraph of previous topic and before the first paragraph of new topic.

Chapters and sub chapters can be varied as per the student’s requirement which is not bound to this template.

# REFERENCE

|  |  |
| --- | --- |
| [1]  | A. Harvey, MICROHYDRO DESIGN MANUAL, Southhampton Row, UK: Intermediate Technology Publisher, 1993.  |
| [2]  | J. M. Aitkan, G. Cromwell and G. Wishert, "MINI AND MICRO-HYDRO IN NEPAL," International Center for Integrated Mountain Development (ICIMD), Kathmandu, Nepal , 1991.  |
| [3]  | "ALLEGRO MICRO SYSTEM," [Online]. Available: https://www.allegromicro.com/en/Products/Current-Sensor-ICs/Zero-To-Fifty-Amp-Integrated-Conductor-Sensor-ICs/ACS712.aspx. [Accessed 4 November 2018].  |
| [4]  | A. K. Sawhney, A Course in Electrical Machine Design, DhanpatRai& Sons, 2004.  |

The IEEE or APA style is recommended for the references. Reference citations within the text should be in the form of numbers within square brackets (e.g. [1]).

References should be in a separate section at the end of the report.

The references should be placed according to their occurrence in the texts in respective chapters.

Note

Each copies of thesis need to be provided with hard binding to

* The Department with softcopy
* The Library
* The University purpose
* The Supervisors
* Students can print copies sufficient for each group members.

# APPENDIX

You could include survey instruments, additional data, computer printouts, details of a procedure or analysis, a relevant paper that you wrote datasheetsetc

.