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**HARNESSING HYDROELECTRIC POWER USING VERTICAL AXIS TURBINE**

##

By

#### Mr. XYZ



National Institute of Technology Arunachal Pradesh

(Established by Ministry of Education, Govt. of India) Jote, District: Papum Pare, Arunachal Pradesh - 791 113

May, 2022

**HARNESSING HYDROELECTRIC POWER USING VERTICAL AXIS TURBINE**

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**or**

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By

**Mr. XYZ**

(Registration number)

Under the supervision of:

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Assistant Professor

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National Institute of Technology Arunachal Pradesh

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# ABSTRACT

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###### LIST OF NOTATIONS

**Notations Descriptions**

Pm Mechanical Power, Watt

Pe Electrical Power , Watt

ρ Air Density, Kg/m3

Pm Mechanical Power, Watt

Pe Electrical Power , Watt

ρ Air Density, Kg/m3

Pm Mechanical Power, Watt

Pe Electrical Power , Watt

ρ Air Density, Kg/m3

Pm Mechanical Power, Watt

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ρ Air Density, Kg/m3

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ρ Air Density, Kg/m3

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Pe Electrical Power , Watt

ρ Air Density, Kg/m3

Pm Mechanical Power, Watt

Pe Electrical Power , Watt

###### ACRONYMS

|  |  |
| --- | --- |
| FACTS |  - Flexible AC Transmission System |
| OH |  - Over Head |
| UPFC | - Unified Power Flow Controller |
| VSC | - Voltage Source Converter |
| TCR | - Thyristor –Controlled Reactor |
| TSR | - Thyristor – Switch Reactor |
| STATCOM | - Static Synchronous Compensator |
| SSC | - Static Series Compensator |
| TCSC | - Thyristor Controlled series Compensator |
| GTO | - Gate Turn Off |
| PAR | - Phase Angle Regulator |
| PST | -Phase Shifting transformer |
| IPFC | - Interline power flow Controller |
| OLTC | - On Load Tap Changer |
| LF | - Load Flow |
| PWM | - Pulse Width Modulation |
| PAR | - Phase Angle Regulator |
| PST | -Phase Shifting transformer |
| IPFC | - Interline power flow Controller |
| OLTC | - On Load Tap Changer |
| LF | - Load Flow |
| PWM | - Pulse Width Modulation |

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The thesis manuscript has three basic parts: the preliminary pages, the text and the reference materials.

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Use only Arabic Numerals. Chapter Numbering should be centered on the top of the page using large bold print.

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**CHAPTER 1**

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A chapter can be divided into **Sections, Sub-sections and Sub-sub-sections** so as to present different concepts separately. Sections and sub-sections can be numbered using decimal points, e.g., 2.2 for the second Section in Chapter 2 and 2.3.4 for the fourth Sub- section in third Section of Chapter 2. Use only Arabic Numerals with decimals. Section numbering should be left justified using large bold print.

Example:

###### GENERAL

* 1. **ADSORPTION**

Sub Sections

Use only Arabic Numerals with two decimals. Sub section numbering should be left justified using large bold print.

Example:

###### Adsorption Isotherms

* + 1. **Langmuir Isotherms**

 **etc.**

###### Review of Literature

This shall normally the **Chapter 2** and shall present a critical appraisal of the previous work published in the literature pertaining to the topic of the investigation. The extent and emphasis of the chapter shall depend on the nature of the investigation.

 For Example,

Several researchers attempted to develop mathematical models to simulate the activated sludge process. Some of these models simulate the organic removal mechanisms in wastewater treatment field, which were included in Jorgensen and Gromiec (1985), Henze (1986), Henze et al. (1987a), Tang et al. (1987), and Van Niekerk et al. (1988). The oxygen transfer mechanism has an important place in the activated sludge process. An estimation technique for the oxygen transfer capacity is investigated by Stenstrom et al. (1989).

1. Results and Discussions

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 Equations

All the equations should be typed in equation editor and should be properly numbered For Example,

*X* α X*t* (2.1)

500

450

SSiizzee

4” X 5”

400

350

300

250

200

Cu - RRH Cu - RHA

Pb- RRH

150

100

50

0

100

200

300

400

**Time min**

*Fig. 10. Pseudo Second order plot for Copper and Lead on RRH and RHA*

###### Table 5 Desorption Study

|  |  |  |  |
| --- | --- | --- | --- |
| **Cycle** | **Metal/ Adsorbent** | **Copper** | **Lead** |
| **RRH** | **RHA** | **RRH** | **RHA** |
| 1 | Adsorption | 73% | 97.5% | 81% | 98% |
| Desorption | 99% | 99.5% | 98.5% | 99% |
| 2 | Adsorption | 40% | 30% | 80% | 38% |
| Desorption | 99% | 99% | 98% | 99% |

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###### References

1. For single author

**Bruce Rittmann, E.** (1996) How input biomass affects sludge age and process stability.

*ASCE: Jour.Env.Engg,* **122**, 4-8.

1. Papers with Two Authors,

**Bliss, P. J. and D. Barnas** (1986) Modeling Nitrification in Plant Scale Activated Sludge.

*Water Science and Technology*, **18**,139-148.

1. Papers with more than two Author,

**Capodaglio, A.G., H.V. Jones, V. Novotny and X. Feng** (1991) Sludge bulking analysis and forecasting: application of system identification and artificial neural computing technologies. *Water Res.,* **25**, 1217–24.

1. Books

**APHA, AWWA and WPCF** *Standard methods for the examination of water and wastewater*, 17th Edition, Washington, D.C.: American Public Health Association, 1989.

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