



CERTIFICATE

This is to certify that the report entitled “**Design, Analysis and Fabrication of a Vertical Bicycle Stand**” by **Denish Pratim Bhuyan (MEB16020)**, **SuprodipBorthakur (MEB16007)** and **Jyotismita Das (MEB16058)**, submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, Assam during the academic year 2019-20, in partial fulfillment of the requirements for the Degree of Bachelor of Technology in Mechanical Engineering, is carried out under my guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/Diploma/Certificate.

(Project Supervisor)

Mrs. Barnali Chowdhury

Assistant Professor,

Dept. of Mechanical Engineering

School of Engineering

Tezpur University

Tezpur, Assam



TEZPUR UNIVERSITY

SCHOOL OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING
NAPAAM, DIST: SONITPUR, PIN:784028
ASSAM, INDIA

CERTIFICATE

This is to certify that we have examined this report on “**Design and Manufacturing of Anti-Drowning Vest**” and hereby approve it as a study carried out and presented in a manner required for its acceptance and fulfilment for the Bachelor Degree in Mechanical Engineering for which it has been submitted by

Angshuman Das (MEB16043)
Nilay Borpujari (MEB16048)
Akangksha Bhagawati (MEB16049)

This approval does not necessarily accept every statement made, opinion expressed or conclusion drawn as recorded in this report. It only signifies the acceptance of this report for which it has been submitted.

The *Viva-Voce* of the above candidates of 8th semester B.Tech. (Mechanical Engineering) of their project on 16th July,2020 has been found satisfactory.

.....
Head of Department

.....
Supervisor



TEZPUR UNIVERSITY

SCHOOL OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING
NAPAAM, DIST: SONITPUR, PIN:784028
ASSAM, INDIA

CERTIFICATE

This is to certify that we have examined this report on “**Design of Recumbent Tricycle for Single Leg Amputee**” and hereby approve it as a study carried out and presented in a manner required for its acceptance and fulfillment for the Bachelor Degree in Mechanical Engineering for which it has been submitted by

Bibek Jyoti Dutta (MEB16005)
Biplab Ballav Das (MEB16055)
Siddharth Saikia (MEB16026)

This approval does not necessarily accept every statement made, opinion expressed or conclusion drawn as recorded in this report. It only signifies the acceptance of this report for which it has been submitted.

The *Viva-Voce* of above candidates of 8th semester B.Tech. (Mechanical Engineering) of their project has been held on[16 July, 2020](#)..... and found satisfactory.

.....
Head of Department

.....
Examiner
(Supervisor)

Department of Mechanical Engineering
Tezpur University
Tezpur July 2020



CERTIFICATE

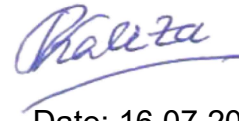
This is to certify that the report entitled "Integrated Coconut Crusher and Grater" by **Arindam Sinha (MEB16028)**, **Preetam Nandi (MEB16060)**, **Dhrubajyoti Das (MEB16054)** submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, in partial fulfillment of the requirements for the Degree of Bachelor of Technology in Mechanical Engineering, is carried out under our guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/Diploma/Certificate.

(Project Supervisor)
Dr. Tapan Kumar Gogoi
Professor

Prabir
July 2020
(Project Supervisor)
Mr. Prabin Haloi
Assistant Professor

CERTIFICATE

This is to certify that the report entitled “**Mechanical Analysis and Concept Design of an Improved Tri-Star Wheel Mechanism for a Stair Climbing Trolley**” by **Pallab Jyoti Das (Roll No. MEB15031)**, **Aditya Changmai (Roll No. MEB16014)** and **Kaushik Brahma (Roll No. MEB16037)**, submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, in partial fulfillment of the requirements for the Degree of Bachelor of Technology in Mechanical Engineering, is carried out under my guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/Diploma/Certificate.



Date: 16.07.2020

(Project Supervisor)

Dr. Paragmoni Kalita

Assistant Professor

Department of Mechanical Engineering
Tezpur University
Tezpur, July 2020



CERTIFICATE

This is to certify that the report entitled “**Shock-Shock Interactions for Inviscid flow over a double wedged ramp**” by **Akangsha Deka (MEB16061) Mriganko Nath (MEB16062) Bhumidhar Das (MEB16064)** submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, in partial fulfillment of the requirements for the Degree of Bachelor of Technology in Mechanical Engineering, is carried out under our guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/Diploma/Certificate.



Date: 16.07.2020

(Project Supervisor)

Dr Paragmoni Kalita

Assistant Professor, Tezpur University

Department of Mechanical Engineering

Tezpur University

Tezpur June 2019



CERTIFICATE

This is to certify that the report entitled “**Design and development of V-type baffles solar air heater**” by **Meghna Borbora (Roll No. MEB16023)**, **Lakhyajit Chutia (Roll No. MEB16024)** and **Krishna Bania (Roll No. MEB16030)**, submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, in partial fulfillment of the requirements for the Degree of Bachelor of Technology in Mechanical Engineering, is carried out under our guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/Diploma/Certificate.

A handwritten signature in blue ink, appearing to read "Dutta", is positioned above the printed name of the project supervisor.

(Project Supervisor)
Prof. Partha Pratim Dutta
Professor

Department of Mechanical Engineering

Tezpur University

Tezpur June 2019



CERTIFICATE

This is to certify that the report entitled “**Experimental Investigation of a Mixed Mode Type Solar Dryer for Northeast Indian Climate**” by **Angshuman Das (Roll No. MEB16051), Shiva Prasad Rai (MEB16057) and Vishal Das(MEB16034)**, submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, in partial fulfillment of the requirements for the Degree of Bachelor of Technology in Mechanical Engineering, is carried out under our guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/Diploma/Certificate.

(Project Supervisor)
Prof. Partha Pratim Dutta
Professor

Department of Mechanical Engineering

Tezpur University

Tezpur June 2019



CERTIFICATE

This is to certify that the report entitled “**Design, fabrication and performance analysis of a Solar water purifier using Parabolic Trough Collector (PTC)**” by **Hreeshikesh Dutta (MEB16011), Lohit Dhungana (MEB16010), Bibek Chakraborty (MEB16066)** submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019, in partial fulfillment of the requirements for the Degree of Bachelor of Technology in Mechanical Engineering, is carried out under our guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/Diploma/Certificate.

(Project Supervisor)
Prof. Partha Pratim Dutta
Professor

Department of Mechanical Engineering
Tezpur University



CERTIFICATE

This is to certify that the report entitled “**DEVELOPMENT OF REAL LIFE SYSTEM OF A VOICE CONTROLLED WHEELCHAIR**” by **Abhishek Kumar (Roll No. MEB16044)**, **Aditi Singh (Roll No. MEB16068)** and **Tonmoy Sharma (Roll No. MEB15029)**, submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, in partial fulfilment of the requirements for the Degree of Bachelor of Technology in Mechanical Engineering, is carried out under our supervision. The work contained in this report has not been submitted elsewhere for a Degree/Diploma/Certificate.

(Project Supervisor)

Polash Pratim Dutta

Assistant Professor



CERTIFICATE

This is to certify that the report entitled “**Experimental and Numerical Thermal Analysis of Friction Stir Welding on Aluminium AA5086**” by **Abhinab Sharma (Roll No. MEB16001)**, **Nabajyoti Ray (Roll No. MEB16001)** and **Bobyraj Tamuli (Roll No. MEB16063)** submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, in partial fulfillment of the requirements for the Degree of Bachelor of Technology in Mechanical Engineering, is carried out under my guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/Diploma/Certificate.

Rakesh Bhadra

Rakesh Bhadra

(Project Supervisor)

Assistant Professor,

Department of Mechanical Engineering,

Tezpur University.

Department of Mechanical Engineering
Tezpur University
Tezpur July 2020



CERTIFICATE

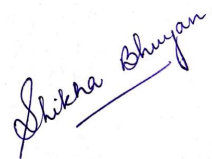
This is to certify that this thesis entitled “**Testing and analysis of impression creep behavior for pure aluminium**” by **Reeturaj Boruah (Roll No. MEB16019), Mehsana Ahmed (Roll No. MEB16003), Bhargav Kumar Das (Roll No. MEB16029)** submitted in Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, in partial fulfillment of the requirements for the degree of Bachelor of Technology in Mechanical Engineering, is carried out under my guidance and supervision. The work contained in this report has not been submitted elsewhere for a degree.

(Project Supervisor)
Dr. Sanjib Banerjee,
Assistant Professor,
Department of Mechanical Engineering,
Tezpur University, Tezpur

CERTIFICATE

This is to certify that the report entitled “**Design and development of a hybrid solar-wind power generation system**” by **Nabanikha Das (Roll No. MEB16038), Amir Sohail (Roll No. MEB16041) and Rajesh Doley (Roll No. MEB16053)** submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-2020, in partial fulfillment of the requirements for the Degree of Bachelor of Technology in Mechanical Engineering, is carried out under my guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree.

Date: 03/06/2020



Shikha Bhuyan

Assistant Professor

Department of Mechanical

Engineering Tezpur University



CERTIFICATE

This is to certify that the report entitled “**STRESS-STRAIN ANALYSIS OF CARBON AND BANANA FIBRE-REINFORCED COMPOSITES USING FINITE ELEMENT METHOD**” by **Aman K Nanadi (MEB16022)**, **Sun Das (MEB16025)**, **Diksha Das (MEB16033)**, submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2020, in partial fulfillment of the requirements for the Degree of Bachelor of Technology in Mechanical Engineering is carried out under our guidance and supervision. The work submitted in the report has not been submitted elsewhere for a Degree/Diploma/Certificate.

Sushen Kirtania

(Project Supervisor)

Dr. Sushen Kirtania

Assistant Professor



CERTIFICATE

This is to certify that the report entitled “**Flood Barrier for Barricaded Compounds**” by **Suraj Chouhan (Roll No. MEB16018)**, **Vivek Kumar (Roll No. MEB16039)**, **Kuldeep Prasad (Roll No. MEB16040)** submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, in partial fulfillment of the requirements for the Degree of Bachelor of Technology in Mechanical Engineering, is carried out under my guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/Diploma/Certificate.

(Project Supervisor)

Dr. Satadru Kashyap

Assistant Professor

Tezpur University
Department of Mechanical Engineering
School of Engineering
Napaam, Sonitpur-784028, Assam, India



CERTIFICATE

This is to certify that the project entitled “**Design, Fabrication and Controlling of a 3 DOF SCARA Manipulator with Vision System**” by **Manoj Sharma, Kuldeep Sarma and Udayaditya Konwar** submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, in partial fulfillment of the requirements for the Degree of Bachelor of Technology in Mechanical Engineering is carried out under my guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/Diploma/Certificate.



(Dr. Sheikh Mustafa Kamal)

Project Supervisor
Assistant Professor, Dept. of Mechanical Engineering
Tezpur University
Assam

June 25, 2021



TEZPUR UNIVERSITY

SCHOOL OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING
NAPAAM, DIST: SONITPUR, PIN:784028
ASSAM, INDIA

CERTIFICATE

This is to certify that we have examined this report on “**NUMERICAL ANALYSIS OF NATURAL CONVECTION OVER A VERTICAL FLAT PLATE WITH VARIOUS BOUNDARY CONDITIONS**” and hereby approve it as a study carried out and presented in a manner required for its acceptance and fulfilment for the Bachelor Degree in Mechanical Engineering for which it has been submitted by

Akshay Buragohain
Sudipta Bhaskar Saikia
Neebir Kashyap

MEB16067
MEB16059
MEB16005

This approval does not necessarily accept every statement made, opinion expressed or conclusion drawn as recorded in this report. It only signifies the acceptance of this report for which it has been submitted.

The *Viva-Voce* of above candidates of 8th semester B.Tech. (Mechanical Engineering) of their project has been held on 16th of July, 2020 and found satisfactory.

Tapan Kumar Gogoi

Head of Department
Mechanical Engineering Department
Tezpur University

CERTIFICATE

This is to certify that the report entitled "**Development of a Pick and Place Mobile System Based on Colour Detection**" is a work completed under my supervision and guidance, hence approved for submission in partial fulfilment for the award of degree of Bachelor Of Technology in Mechanical Engineering to the department of Mechanical Engineering, School of engineering, Tezpur University, Assam in the academic session 2019-2020 for the full time graduation program of 2016-2020. The work contained in this report has not been submitted elsewhere for Degree/Diploma/Certificate.



(Project Supervisor)

Dr. Vivek Kumar Mehta

Assistant Professor, Dept. of Mechanical Engineering

School of Engineering

Tezpur University

Tezpur, Assam

Department of Mechanical Engineering

Tezpur University

Tezpur, July 2020



Certificate I

This is to certify that the work contained in this thesis entitled “**Analysis on Natural Convection with non-Boussinesq approximation**” by **Akash Jyoti Dutta (Roll No. MEM18002)**, submitted in partial fulfilment of the requirements for the degree of Master of Technology in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, is carried out under my guidance and supervision. The work contained in this report has not been submitted elsewhere for a degree.

(Supervisor)

Mrs. Shikha Bhuyan

Assistant Professor

Department of Mechanical Engineering

Tezpur University

Tezpur-784028, Assam, India,

2020

Department of Mechanical Engineering
Tezpur University
Tezpur July 2020



CERTIFICATE

This is to certify that the report entitled “**Cooling Load Calculation and Proposition of a Solar Cooling System in Tezpur Assam, India**”, submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2020-21, in partial fulfillment of the requirements for the Degree of Master of Technology in Mechanical Engineering, is carried out under my guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/Diploma/Certificate.

A small rectangular box containing a handwritten signature and the date '13/07/2020'.

Prof. Tapan Kr. Gogoi

(Project Supervisor)
Tapan Kumar Gogoi
Professor

Department of Mechanical Engineering
School of Engineering
Tezpur University, Tezpur-784028
INDIA

CERTIFICATE

It is certified that the work contained in the thesis titled “**Analysis of Rotational Autofrettage of Disks Incorporating von Mises Yield Criterion**” submitted by **Mr. Avinash Chetry** to the Tezpur University for the award of the degree of Master of Technology in Mechanical Engineering (Specialization: Machine Design) has been carried out under my supervision in the Department of Mechanical Engineering, School of engineering, Tezpur University. This work has not been submitted elsewhere for the award of any other degree or diploma.



(Thesis Supervisor)

Dr. S. M. Kamal

Assistant Professor

Department of Mechanical Engineering

Tezpur University

Tezpur-784028

Assam, INDIA

July 05, 2020

DEPARTMENT OF MECHANICAL ENGINEERING
TEZPUR UNIVERSITY
TEZPUR, JULY 2020



CERTIFICATE

This is to certify that the report entitled "Effects of weathering on composite materials" by **Debanil Das (Roll No. MEM18006)**, submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, in partial fulfillment of the requirements for the Degree of Master of Technology in Mechanical Engineering, is carried out under my guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/Diploma/Certificate.

A handwritten signature in blue ink, reading "Satadru Kashyap".

(Project Supervisor)

Dr. Satadru Kashyap

Assistant Professor

Department of Mechanical Engineering

Tezpur University

Tezpur, July 2020



Certificate

This is to certify that the report entitled “**DESIGN AND THERMAL PERFORMANCE MODELING OF AN IMPROVED NATURAL DRAFT BIOMASS FIRED COOK STOVE**” by **Niyar Jyoti Bharali (Roll No. MEM18007)**, submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, in partial fulfillment of the requirements for the Degree of Master of Technology in Mechanical Engineering, is carried out under our guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/ Diploma.

A handwritten signature in blue ink, appearing to read "Dutta", is written above a horizontal line.

(Supervisor)

(Project Supervisor)

Dr. Partha Pratim Dutta

Professor

Department of Mechanical Engineering,

Tezpur University, Tezpur

Department of Mechanical Engineering
Tezpur University

Tezpur, July 2020



CERTIFICATE-I

This is to certify that the work contained in this thesis entitled "Evaluation of Elastic Properties and Stress Analysis of Graphene Nanoplatelet/Epoxy Laminated Nanocomposite" by Amdadul Mahmum (Roll No. MEM18008), submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, in partial fulfillment of the requirements for the Degree of Master of Technology in Mechanical Engineering, is carried out under my guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/Diploma/Certificate.

Sushen Kirtania

(Project Supervisor)

Dr. Sushen Kirtania

Assistant Professor

Department of Mechanical Engineering

Tezpur University

Tezpur-784028, Assam, India

Department of Mechanical Engineering

Tezpur University

Tezpur, July 2020



Certificate

This is to certify that the work contained in this thesis entitled “**Numerical Study of Inviscid Shock Interactions on Semi-Cylinder and Double-Wedge Geometry**” by **Avinash Yadav (Roll No. MEM18010)**, submitted in partial fulfillment of the requirements for the degree of Master of Technology in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2018-2020, is carried out under my guidance and supervision. The work contained in this report has not been submitted elsewhere for a degree.



Date: 15.07.2020

(Supervisor)

Dr. Paragmoni Kalita
Assistant Professor
Department of Mechanical Engineering
Tezpur University
Tezpur-784028, Assam, India,
2020



April 30th, 2020

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Bitopan Deka, has done his internship with us from August 19th, 2019 to April 30th, 2020.

He has successfully completed his Internship in Cummins Emission Solutions, Customer Engineering Department. During his tenure with the company, he undertook and participated in the following project-

Project Title: Analysis of duty cycle of BS VI vehicles and development of infant care diagnostic tool.

His performance was found satisfactory during the period.

We wish him all the best for all his future endeavors.

Thanking You

A handwritten signature in black ink, appearing to read 'Prabeer', written over a set of diagonal lines that form a signature guide.

Prabeer Kumar Maiti
HR Leader – CES India

Cummins Technologies India Private Limited
(Formerly known as Cummins Technologies India Limited)
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TEZPUR UNIVERSITY

SCHOOL OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING
NAPAAM, DIST: SONITPUR, PIN:784028
ASSAM, INDIA

CERTIFICATE I

This is to certify that the report entitled “**Mathematical modeling and analysis of heat transfer parameters of a shell and tube heat exchanger using Design of Experiments (DOE)**” by Ms Bikshya Saikia (MEM18012), submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, in partial fulfillment of the requirements for the Degree of Master of Technology in Mechanical Engineering, is carried out under my guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/Diploma/Certificate.

Date: 13-July- 2020

(Project Supervisor)

Mrs. Barnali Chowdhury

Assistant Professor

Mechanical Engineering
Department

Tezpur University, Assam



Ref: Cummins/PSBU/CIL/INTERN
30 April 2020

CERTIFICATE

This is to certify that Ananda Ram Barman, from Tezpur Central University, Assam has successfully completed his Project in Cummins India Limited - Power Systems Business Unit.

He has done his project with us from 8/19/2019 to 4/30/2020

The topics of his project was-

- Design and Analysis of Turbo charger heat shield in QSK19 TIER 3 Engine for mining segment.

His performance was found satisfactory during the period.

We wish him all the best for all his future endeavors.

For Cummins India Limited

A handwritten signature in blue ink, appearing to read "Tushar Tejawat".

Tushar Tejawat
Sr. General Manager, HR - Power Systems

Cummins India Limited
Registered Office
Cummins India Office Campus
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DEPARTMENT OF MECHANICAL ENGINEERING

TEZPUR UNIVERSITY

TEZPUR JULY 2020



CERTIFICATE I

This is to certify that the work contained in this thesis entitled “**Thermo-Mechanical Analysis of Friction Stir Welding on Al Alloy**” by **Swrang Mushahary** (Roll No. **MEM18014**), submitted in partial fulfillment of the requirements for the degree of Master of Technology in Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, is carried out under my guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/Diploma/Certificate.



(Supervisor)

(Supervisor)

Dr. Sanjib Banerjee

Mr. Rakesh Bhadra

Assistant Professor

Assistant Professor

Department of Mechanical Engineering

Department of Mechanical Engineering

Tezpur University

Tezpur University

Tezpur-784028, Assam

Tezpur-784028, Assam

July, 2020

July, 2020

DEPARTMENT OF MECHANICAL ENGINEERING
TEZPUR UNIVERSITY
TEZPUR JULY 2020



CERTIFICATE I

This is to certify that the work contained in this thesis entitled "ANN-GA Based Hybrid Model for Intelligent Estimation of Process Parameters in Laser Forming Process" by **Sundar Pratim Borah** (Roll No. MEM18015), submitted in partial fulfillment of the requirements for the degree of Master of Technology in Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, is carried out under my guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/Diploma/Certificate.

(Supervisor)

Dr. Polash Pratim Dutta
Assistant Professor

Department of Mechanical Engineering
Tezpur University

Tezpur-784028, Assam

July, 2020



TEZPUR UNIVERSITY

SCHOOL OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING
NAPAAM, DIST: SONITPUR, PIN: 784028
ASSAM, INDIA

CERTIFICATE I

This is to certify that the report entitled “**Experimental and Numerical Studies on the Performance of a 4-Stroke Spark-Ignition Engine**” by Pritam Jyoti Saikia (MEM18016), submitted in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2019-20, in partial fulfillment of the requirements for the Degree of Master of Technology in Mechanical Engineering, is carried out under our guidance and supervision. The work contained in this report has not been submitted elsewhere for a Degree/ Diploma/ Certificate.

Date: 15.07.2020

(Project Supervisor)

Dr. Partha Pratim Dutta
Professor
Department of Mechanical Engineering
Tezpur University
Tezpur-784028, Assam, India

Date: 15.07.2020

(Project Supervisor)

Dr. Paragmoni Kalita
Assistant Professor
Department of Mechanical Engineering
Tezpur University
Tezpur-784028, Assam, India,



Department of Mechanical Engineering

Tezpur University

CERTIFICATE

This is to certify that the dissertation entitled “**An Analytical study on Multi-Effect Desalination System**” is submitted by **Lakhyajit Nath** bearing Roll no: **MEM18017**. The dissertation is found worthy of acceptance for the award of Master of Technology in Mechanical Engineering. He has worked under the supervision of Dr. Tapan Kumar Gogoi.

Date: 15/07/2020

Place: Tezpur

A handwritten signature in black ink, followed by the date '15/07/2020' written below it.

Dr. Tapan Kumar Gogoi
Professor and HOD
Department of ME
Tezpur University

Department of Mechanical Engineering

Tezpur University

Tezpur, July 2020



Certificate I

This is to certify that the work contained in this thesis entitled “**Modelling and Design of a Solar Air Heater with Energy Storage through Paraffin Wax as Phase Change Material(PCM) (Roll No. MEM18018)**”, submitted in partial fulfilment of the requirements for the degree of Master of Technology in the Department of Mechanical Engineering at Tezpur University, Tezpur, during the academic year 2018-2020, is carried out under my guidance and supervision. The work contained in this report has not been submitted elsewhere for a degree.


A handwritten signature in blue ink, appearing to read "Dutta", is written above a horizontal line.

(Supervisor)

Dr. Partha Pratim Dutta
Professor
Department of
Mechanical Engineering
Tezpur University
Tezpur-784028, Assam.
July,2020

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Advances in Mechanical Engineering pp 709-716 | Cite as

Performance Analysis of a Coal-Fired Open Cycle MHD Plant at Constant Subsonic Inlet Nozzle Mach Number with Variation in Nozzle–Area Ratio

Authors Authors and affiliations

Prabin Haloi , Tapan Kumar Gogoi

Conference paper
First Online: 17 January 2020

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Abstract


In the present work, a coal-fired magnetohydrodynamics (MHD) power plant is analyzed to predict its performance using constant nozzle inlet Mach number. Two supersonic nozzles,

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Advances in Applied Mechanical Engineering pp 81-89 | Cite as

Exergy Modelling of a Coal-Fired MHD Power Plant

Authors Authors and affiliations

Prabin Haloi , Tapan Kumar Gogoi

Conference paper
First Online: 02 February 2020

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Abstract

Energy quality can be best measured through the application of the proven method of exergy analysis. Exergy analysis of thermal systems provides a better way to determine the deficient sub-components and also estimate the amount of losses that occurred in such components. The present work models a coal-fired open-cycle Magneto-hydrodynamics (MHD) power generation system in terms of exergy analysis. The exergy analysis is carried out side-to-side energy analysis in order to determine the components with major energy losses and exergy destruction

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Cite paper



Thermal performance studies for drying of *Garcinia pedunculata* in a free convection corrugated type of solar dryer

Pooja Dutta, Partha Pratim Dutta*, Paragmoni Kalita

Department of Mechanical Engineering, Tezpur (Central) University, Napaon, District: Golaghat, Assam, PIN: 786024, India



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Garcinia pedunculata
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 Thermal efficiency
 Payback period

ABSTRACT

The present work focuses on drying of *Garcinia pedunculata* in an efficiently developed free convection corrugated solar dryer (FCCSD) and conventional open sun. The experimental solar drying results for two batches are presented. The moisture contents of *Garcinia pedunculata* in the dryer was reduced to 7.22% (wb) for the first batch and 7.13% (wb) for the second batches in 28 h from the initial 88% (wb) of moisture content. Moisture content was reduced to 10.08% (wb) and 10.08% (wb) for the first and second batches respectively in 55 h in open sun drying. Midilli and Kucuk model was found the most suitable for drying process in the developed solar dryer. Two-Term model was suitable for open sun drying. The average thermal efficiencies of the solar dryer for the first and second batches were evaluated as 33.29% and 33.45% respectively. The average specific energy requirement and average thermal efficiency of the FCCSD were estimated as 89.00 kWh/kg⁻¹ and 10.89% for the first batch 95.54 kWh/kg⁻¹ and 10.77% respectively for the second batch. For the newly developed FCCSD, the payback period was estimated as 06 year.

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1. Introduction

Drying is one of the most primitive and vital methods to store agricultural products for food security, preservation, safety, easy handling, and cost-effective transportation [1,2]. Over the past decades, different solar dryers have been designed, developed and experiments have been carried out with these equipments for drying of a wide variety of agricultural products like chilli, ginger, turmeric, apple, banana, tea and herbs and spices [3–8]. However, literature is not available on the design and development of free convection corrugated solar dryers for *Garcinia pedunculata* (GP), a unique agricultural product available in the North East region of India. GP has immense medicinal characteristics but often it is ignored because of the seasonality of the fruit. The tree starts bearing flowers by September–October and opens in April. The monsoon dominates at this time of the year and it is very difficult to dry products in such an adverse condition. Along with it, the uncertainty of climatic conditions all across the world has created unexpected problems for the farmers as well as consumers. GP is an advantageous fruit and improper storage may lead to

contamination. GP increases digestion, cleanses urine and feces, acts as a cathartic tonic, relieves constipation, relieves abdominal colic pain, cures tumour of abdomen, cough and cold, asthma, worm infestation, indigestion, vomiting, etc. It played an important role in the treatment of various diseases such as diabetes, Alzheimer's and normal aging [9,10]. The family of *Garcinia* is a prolific source of secondary metabolites with a broad range of activities including xanthones, flavonoids, benzophenones, lactones and phenolic acids [11].

A developed indirect type of solar dryer was reported for drying kinetics studies of satrana grapes. Twenty-two experiments were conducted in the forced convection solar dryer for testing the effect of air velocity and temperature. The regression analysis was performed for choosing the best drying model and out of the eight chosen, the Two-term model was reported satisfactory [13]. Midilli and Kucuk [14] developed a mathematical model of shelled and de-corticated pistachios in the forced and natural drying processes. Out of the eight selected drying models, they found that the logarithmic model satisfactorily described forced drying and the Two-term model described the natural drying. The solar drying kinetics of prickly pear peel was studied by Lahniani et al. [15] in a forced dryer. They used variable drying air temperatures and flow rates together with the relative humidity and intensity of radiation. Alpinar [16] conducted a drying experiment on white mulberry in a

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Study of energy management in a tea processing industry in Assam, India

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Anindita Sharma, Ajoy K. Dutta, Monjit K. Bora, and Partha P. Dutta



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Study of Energy Management in a Tea Processing Industry in Assam, India

Anindita Sharma^{1,a)}, Ajoy K. Dutta^{2, b)}, Monjit K. Bora^{2, c)} and Partha P. Dutta^{1, d)}

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Abstract Tea is one of the most popular beverages around the world. India accounts for around 31% of the production globally. Tea contributes 1% of the GDP of the country. The two major issues related to tea industry are energy and environment. Tea processing is energy intensive as the various stages of tea production consume energy in the form of thermal or electrical energy. The energy costs constitute around 30% of the total tea processing costs. Various data related to the energy consumption and cost incurred are analysed in a tea processing industry in Assam, India and compared with that of the South Indian tea industries. The analysis shows that thermal energy consumption is around 43% higher than that consumed in the South Indian industries. The total electrical and thermal energy required for the production process is about 42% and 58% respectively. Natural gas requirement for thermal energy contributes to a large portion of the production cost. One of the approaches to tackle the energy and environmental problems is the implementation of energy efficient and environmentally active production processes. Solar thermal energy and biomass are such possible alternatives to meet such issues as they reduce overall greenhouse emission compared to fossil fuel utilization. However, it is also equally essential to motivate the tea growers to take such measures.

INTRODUCTION

Tea is one of the oldest consumed drinks in the world. World tea production as well as consumption has seen a continuous increase during the recent years [1]. It can be considered as an industry in which India has emerged as the leader for over 150 years [2]. Indian tea industry has recorded the highest production during the financial year 2017-18, the total tea production being 1325.05 million kg [3]. Assam produces around 52% of the total tea production in India, which is the largest [4]. Tea processing is energy intensive. Withering, drying, grading and packing of tea require 14.4-64.8 MJ/kg of made tea. The energy costs constitute around 30% of the total tea processing costs. In India, the total fuel consumption by the tea sector contributes 1,352,000 tons of CO₂ emissions annually [5].

The available literature shows that the tea manufacturing processes consume thermal and electrical energy in the ratio of 85:15. The specific energy consumption ranges between 14.4-144.4 MJ/kg of made tea [6, 7]. Tea drying is the most energy intensive operation amongst all other operations. The plantation and transportation consumes energy in the form of petro-fuels [8]. The poor energy utilities give rise to more environmental problems [9]. A huge amount of energy could be saved by utilizing the waste generated during tea manufacturing [10]. Non-conventional

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1. Name (in block letters) in full : SANJIB GOGOI
2. a) Date of admission : 22nd July, 2017
b) Department : Mechanical Engineering
c) Roll No : MEP17101
d) Category : Full-Time
e) Name of the supervisor : Dr. Sanjib Banerjee
f) No of semester completed : 06
3. Period of fellowship applied for : From 01st September, 2020 to 30th September, 2020
4. Are you receiving any other fellowship/scholarship during the above mentioned period? Yes/No
If yes, please detail: No

Date: 24.09.2020

Sanjib Gogoi
Signature of the applicant

RECOMMENDATION OF SUPERVISOR

The progress of the student is satisfactory/ not satisfactory in the semester.

Attendance: No of days presents:

No of working days:

Sanjib Banerjee

Date:

Signature of the Supervisor

FORWARDING NOTE OF HEAD OF THE DEPARTMENT

The attendance of the student during the period was found satisfactory and recommended for release of the fellowship (In case of the progress not satisfactory, please do not forward the application).

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Signature of Head,

Department of _____

Date: _____

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2. **Roll. No.:** MEP18102
3. **Department:** Mechanical Engineering
4. **School:** Engineering
5. **Name of Supervisor:** Prof. Tapan Kumar Gogoi
6. **Name of the Co-Supervisor with his/her affiliation:** Nil
7. **Synopsis /Area of work:** Exergoenvironomic analysis and optimization of several gas turbine-based cogeneration systems.
8. **Introduction:** Separate sheet attached (Page: 1-3)
9. **Objectives:** Separate sheet attached (Page: 3)
10. **Review of literature:** Separate sheet attached (Page: 3-7)
11. **Methodologies/approach(es) applied:** Separate sheet attached (Page: 8-16)
12. **Bibliography:** Separate sheet attached (Page: 17-20)
13. **Proposed collaboration with / assistance from other Depts. Of T.U. / other institutions / universities / laboratories (if any):** Nil

Prof. Tapan K. Gogoi
Signature of Supervisor

Digitally signed by Joy Nondy
Date: 2023.01.18
13:41:16 +0530
Joy Nondy
Signature of student

Signature of Co supervisor

Prof. Tapan K. Gogoi
Signature of the Head of the Department



TEZPUR UNIVERSITY

REPORT OF EXAMINERS OF ORAL DEFENCE EVALUATION COMMITTEE

The examiners of Oral Defense Evaluation Committee (ODEC) certify that the thesis entitled "Performance evaluation of single and double effect H₂O-LiCl absorption refrigeration systems through exergy analysis and Optimization" submitted by Mr. Dwipen Konwar (MEP150001) to the Tezpur University in partial fulfillment of requirement of the Ph.D. degree in the discipline of Mechanical Engineering under the school of Engineering has been examined on 13/03/2020 and recommend that:

the degree be awarded

Signature of

Dr. Tapan Kr. Gogoi
Supervisor 13/03/2020

Co-supervisor

R. Saravanan
External Examiner 13/3/2020

Name: Tapan Kr. Gogoi

Name:

Name: R. SARAVANAN

Date: 13/03/2020

Forwarded to Controller of Examination

Memo No.:

Dr. Tapan Kr. Gogoi
Signature of Head of the Department



Comparative assessment of four novel solar based triple effect absorption refrigeration systems integrated with organic Rankine and Kalina cycles

T.K. Gogoi^a, P. Hazarika

^a Department of Mechanical Engineering, Tezpur University, Tezpur 784028, India

ARTICLE INFO

Keywords:

Thermodynamic analysis
Performance comparison
Solar integrated system
Triple effect absorption refrigeration system
Organic Rankine cycle
Kalina cycle

ABSTRACT

In this study, the performance of four novel solar integrated systems are compared with the help of energy and exergy analysis. The systems either use a single unit or two units of a triple effect absorption refrigeration system for cooling production through utilization of hot water obtained at the solar collector exit. The power cycles are based on organic Rankine and Kalina cycles. For the systems with two absorption refrigeration system units, it was found that when the system is integrated with the Kalina cycle, it provides better performance in terms of power, efficiency and irreversibility rate. At solar radiation intensities of 600 W/m^2 (low) and 900 W/m^2 (high), the net power obtained from the Kalina cycle are respectively $\sim 1.7\%$ and $\sim 10\%$ more while its irreversibility are 16.24% and 16.28% less compared to those of an ORC based organic Rankine cycle. In a different arrangement, when one unit of the absorption refrigeration system is replaced by another irreversible based organic Rankine cycle, no doubt the cooling output reduces but the net power of the system with one organic Rankine cycle (top-bottom branch) and one Kalina cycle increases in an average by 22.83% that the two solar radiation intensities. This increase in average net power output is however less (9.84%) for the system with two organic Rankine cycles.

1. Introduction

Rapid urbanization and population growth has increased the rate of global energy consumption at an alarmingly high rate. This has posed a serious threat to the available fossil reserves, aggravating simultaneously the problems of environmental degradation, global warming, and ozone layer depletion. The need of the hour is, therefore, to ascertain sustainable growth through use of renewable energy sources. Among the renewable energy sources, solar energy has become popular owing to its free availability and the recent development in solar trapping technologies. Solar based energy technology is used in many applications for production of electricity, cooling, heating, fresh water and hydrogen etc. in multigeneration mode. Solar hybrid multigeneration systems are highly efficient for generating several useful outputs from the same energy source [1].

For cooling, through use of solar technology, the absorption refrigeration systems (ARs) are used which can be of half, single, double and triple effect type. Double and triple effect ARs are suitable for hot source of higher temperature and they also provide higher coefficient of performance (COP) compared to the half and single effect type ARs.

COP increases with the number of effects and thus, the triple effect system gives the highest COP, followed by the double effect, single effect and so on. A few novel solar cooling systems were proposed and evaluated in some previous research studies. Bailamwala et al. [2], using the weather data of United Arab Emirates, investigated the performance of an integrated solar photovoltaic-thermal (PV/T), electrolyzer and triple effect AR. They evaluated the effect of monthly average solar radiation, electrolyzer operating time, air inlet temperature and PV module area on solar power, rate of heat and hydrogen production, overall system efficiencies (energy and exergy) and COPs (energetic and exergitic) of the AR. Agarwal et al. [3] proposed a solar powered triple effect refrigeration cycle comprising of a Rankine cycle, an ejector based refrigeration system, a single effect AR, and a two stage cascaded vapor compression refrigeration cycle to produce refrigeration output of different magnitude at different temperature. Li et al. [4] evaluated the performance of a solar operated air cooled double effect AR at different collector temperatures using the meteorological data of a subtropical city (Guangzhou) in China. Shirazi et al. [5] made feasibility studies of five solar powered single, double and triple effect absorption cooling and heating systems by evaluating their performance from energy, economic, and environmental aspects under different climate

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22
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Head & Supervisor of
Pradyumn Hazarika
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Tezpur University

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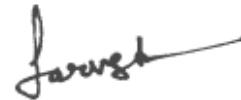
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We wish Vivek all the best for future endeavours.



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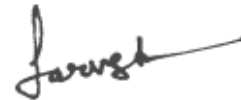
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He was found to be hardworking, dedicated and devoted towards his training. His conduct during the training period was observed to be good.

We wish success in all his future endeavours.

Yours faithfully

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8/2/8/2021

(ARATI DAS)

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For **RESIDENT CHIEF EXECUTIVE**



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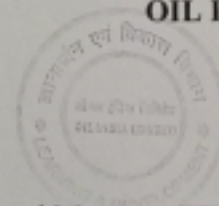
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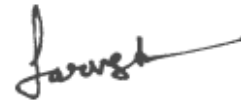
Arati Das

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Noonmati, Guwahati - 781020, Assam.

Fax : 0361-2657250, 2657251

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Website : www.iocl.com

E-mail id : GR@indianoil.in



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During the internship, he/ she has been found to be punctual and diligent. After completion of the internship, he/ she has submitted an Industrial Training/Project Report at Indian Oil Corporation Limited, Guwahati Refinery.

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Project Name: REPORT ON VARIOUS DEVICES, BEARING AND LUBRICATION USED IN INDIAN OIL CORPORATION LIMITED, GUWAHATI REFINERY.

Project Guide: Mr. R K Linda, SM(MS,L&D)

Date: 13-09-2021

Place: Guwahati Refinery

Debanuja Borah
Ms. Debanuja Borah

Manager (L & D)

देबानुजा बोरा/ Debanuja Borah

प्रबंधक (एल स्वं डी)

Manager (L&D)

आई ओ सी एल गुवाहाटी रिफाइनरी, नूनमाटी, गुवाहाटी-२०
IOCL Guwahati Refinery, Noonmati, Guwahati-20

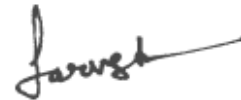
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Pallab is a top performer in the training.

We wish Pallab all the best for future endeavours.



Sarvesh Agarwal

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इंडियन ऑयल कॉर्पोरेशन लिमिटेड

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नूनमाटी, गुवाहाटी-७८१०२० (असम)

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Indian Oil



Guwahati Refinery

To Whom It May Concern

This is to certify that **VIKASH RANJAN**(2021001158) a student of 6th Semester in B. Tech. in **MECHANICAL ENGINEERING** from **SCHOOL OF ENGINEERING, TEZPUR UNIVERSITY** has undertaken virtual internship at Indian Oil Corporation Limited, Guwahati Refinery from 15-07-2021 to 15-08-2021.

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We wish him/ her all success in life.

Project Name: OVERALL REFINERY OPERATIONS

Project Guide: Mr. Jyoti Borah, M(CONT)

Date: 21-09-2021

Place: Guwahati Refinery

Debanuja Borah

Ms. Debanuja Borah

Manager (L & D)

देबानुजा बोरा/ Debanuja Borah

प्रबंधक (एल स्वं डी)

Manager (L&D)

आई ओ सी एल, गुवाहाटी रिफाइनरी, नूनमाटी, गुवाहाटी-२०
IOCL, Guwahati Refinery, Noonmati, Guwahati-20

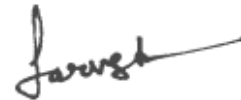
Certificate of Training

Sachin Singh

from SCHOOL OF ENGINEERING TEZPUR UNIVERSITY, ASSAM has successfully completed a 6-week online training on **MATLAB**. The training consisted of Introduction, Foundations, Mathematics, Functions, Plotting, Programming, Case Studies, and Final Project modules.

In the final assessment, Sachin scored 53% marks.

We wish Sachin all the best for future endeavours.



Sarvesh Agarwal

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-09-22 Certificate no. : E6916A49-CDDF-608C-A536-8D05BA5ADCB2

For certificate authentication, please visit https://trainings.internshala.com/verify_certificate

Dr. Sougata Karmakar
Associate Professor
Department of Design

भारतीय प्रौद्योगिकी संस्थान गुवाहाटी
Indian Institute of Technology Guwahati
Guwahati-781 039, Assam, India

Phone : +91 361 2582464
Fax : +91 361 2690762
Mob : +91 8011403513
E-mail : karmakar.sougata@iitg.ernet.in
karmakar.sougata@gmail.com



DEPARTMENT OF DESIGN

Date: 14.09.2021

TO WHOM IT MAY CONCERN

This is to certify that Mr. Arohan Neog (Roll No. MEB18035), a 6th Semester student of B.Tech. in Mechanical Engineering from Tezpur University, Assam, India, has undergone online/ virtual summer training (duration: 26th May to 28th July, 2021) at Ergonomics Laboratory, Department of Design, Indian Institute of Technology (IIT) Guwahati, Guwahati-781039, Assam, India. He was associated with the ongoing research work of one of my PhD student Mr. Gurdeep Singh and was involved in a live project 'Ergonomic improvement of industrial workstations in FMGC sector'.

He is a very enthusiastic student and has spirit to work in a team in professional manner. He is disciplined, sincere and energetic student with good learning capabilities.

I wish him success in life.

Sincerely,

Sougata Karmakar.

(Dr. Sougata Karmakar) Associate Professor
Department of Design
Indian Institute of Technology Guwahati
Guwahati - 781039



Bongaigaon Refinery

Ref No: BGR:HR:L&D:SIT 2021– 230

Date: 07.08.2021

TO WHOM IT MAY CONCERN

This is to certify that Pulastya Roy, a 6th semester student of Mechanical Engineering of Tezpur University, Napaam, Assam has undergone virtual internship training conducted by Indian Oil Corporation Ltd, Bongaigaon Refinery, Dhaligaon from 28.06.2021 to 31.07.2021.

During the period of virtual training Pulastya Roy was given exposure to various functions of the Refinery with special emphasis on operation & maintenance of its different units including industrial safety.

Pulastya Roy took keen interest while attending various virtual sessions and engaged himself in meaningful interaction with faculties apart from demonstrating his discipline and punctuality.

Upon completion of the training, Pulastya Roy has submitted a training report. IOCL, Bongaigaon Refinery wishes Pulastya Roy all success in his future endeavour,

On behalf of IOCL, Bongaigaon Refinery

(SMS ISLAM)
DGM (L&D)

एस एम एस इस्लाम / SMS Islam
उप महाप्रबन्धक (एल एण्ड डी) / Dy General Manager (L&D)
बोनाइगाँव रिफाइनरी, इंडियन ऑयल कॉर्पोरेशन लिमिटेड
Bongaigaon Refinery, Indian Oil Corporation Limited
डाकघर : धालीगाँव, P.O.:Dhaligaon-783385
जिला : चिरांग (असम) Dist.:Chirang (Assam)

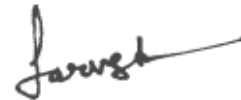
Certificate of Training

Shivam Bhardwaj

from School Of Engineering Tezpur University, Assam has successfully completed a 6-week online training on **AutoCAD**. The training consisted of Interface, Drawing Aids & Basic Objects, Complex Objects & Object editing, Blocks & Annotations, and Plotting & Introduction to 3D modules.

Shivam scored 100% marks in the final assessment and is a top performer in the training.

We wish Shivam all the best for future endeavours.



Sarvesh Agarwal

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-09-25

Certificate no. : 51F33280-2A00-57BC-99CA-1AB84B83326C

For certificate authentication, please visit https://trainings.internshala.com/verify_certificate

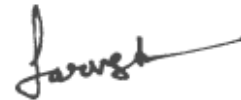
Certificate of Training

BALVANT SINGH

from Tezpur University(A Central University) has successfully completed a 6-week online training on **SOLIDWORKS**. The training consisted of SolidWorks- Introduction, Interface and Sketching, Applying Features and Material, SolidWorks Assembly, SolidWorks Drawing and Portfolio Building, and Final Project- Air Piston-Cylinder Assembly modules.

BALVANT is a top performer in the training.

We wish BALVANT all the best for future endeavours.



Sarvesh Agarwal

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-11-11

Certificate no. : 590C0BD4-325A-2123-BF1E-7F674F323835

For certificate authentication, please visit https://trainings.internshala.com/verify_certificate



रिफाइनरीज प्रभाग
Refineries Division

इंडियन ऑयल कॉर्पोरेशन लिमिटेड

रिफाइनरीज प्रभाग: गुवाहाटी रिफाइनरी
नूनमाटी, गुवाहाटी-७८१०२० (असम)

Indian Oil Corporation Limited

Refineries Division : Guwahati Refinery

Noonmati, Guwahati-781020, Assam

Fax : 0361-2657250, 2657251

EPABX : 0361-2597000

Website : www.iocl.com

E-mail id : GR@indianoil.com



Indian Oil



Guwahati Refinery

To Whom It May Concern

This is to certify that **AMBIKA SWARGIARY**(2021001210) a student of 6th Semester in B. Tech. in MECHANICAL ENGINEERING from TEZPUR UNIVERSITY has undertaken virtual internship at Indian Oil Corporation Limited, Guwahati Refinery from 15-07-2021 to 15-08-2021.

During the internship, he/ she has been found to be punctual and diligent. After completion of the internship, he/ she has submitted an Industrial Training/Project Report at Indian Oil Corporation Limited, Guwahati Refinery.

We wish him/ her all success in life.

Project Name: REFINERY OPERATIONS

Project Guide: Mr. Soikat Shankar Chakraborty, MNM

Date:28-09-2021

Place: Guwahati Refinery

Debanuja Borah
Ms. Debanuja Borah

Manager (L&D)

देवानुजा बोरा/ Debanuja Borah

प्रबंधक (एल स्वं डी)

Manager (L&D)

आई ओ सी एल, गुवाहाटी रिफाइनरी, नूनमाटी, गुवाहाटी-२०
IOCL, Guwahati Refinery, Noonmati, Guwahati-20



Diesel Loco Shed

ডীজেল লোকো শেড

ডিজেল লোকো শেড



This is to certify that Mr./Miss **NIKUNJA NARAYAN KUMAR**

Students of **TEZPUR UNIVERSITY** has undergone theoretical and practical

training at Diesel Loco Shed, New Guwahati from **29-12-2020 To 06-01-2021**

We wish him / her all the success in future endeavours.

Kamaljit Deles
 06/01/2021
 Chief Instructor / DTTC / DLS NGC
 CHIEF INSTRUCTOR
 DIESEL TRACTION TRAINING CENTRE
 NEW GUWAHATI N.F. RLY

06.01.21
 ADME / Diesel / New Guwahati
 সহকারী মেকানিক্যাল ইঞ্জিনিয়ার,
 নতুনগুৱাহাটী ডীজেল শেড / পূ.রী. রং
 Asstt. Div. Mech. Engineer /
 New Guwahati Diesel Shed

CERTIFICATE NO : GT/SR/215911

DATE : 13th Aug 2021



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CERTIFICATE

OF COMPLETION

This is to certify that

Chinmoy Baruah

Has successfully Completed 6 Weeks Virtual Internship on
“INDUSTRIAL CAD WITH CATIA & SIMENS NX”

held from 11th June 2021 to 30th July 2021



Skill India
कौशल भारत - कुशल भारत

CEO, Skyy Rider Institution

MD, Gram Tarang

CERTIFICATE of COMPLETION

This Certificate is awarded to

Chinmoy Baruah

Has successfully Completed 6 Weeks Virtual Internship on
“INDUSTRIAL CAD WITH CATIA & SIMENS NX”
held from **11th June 2021** to **30th July 2021**



An ISO 9001:2015, ISO 29990:2000
CERTIFIED COMPANY

Certificate No- SRI-OT01-2144056

Date - 13th Aug 2021



Chief Executive Officer
Skyy Rider Institutions Pvt Ltd.

CERTIFICATE NO : GT/SR/215909

DATE : 13th Aug 2021



www.gramtarang.in



In Partnership with



CERTIFICATE

OF COMPLETION

This is to certify that

JYOTIRMOY DAS

Has successfully Completed 6 Weeks Virtual Internship on
“INDUSTRIAL CAD WITH CATIA & SIMENS NX”

held from 11th June 2021 to 30th July 2021



Skill India
कौशल भारत - कुशल भारत

A handwritten signature in black ink, likely belonging to the CEO of Skyy Rider Institution.

CEO, Skyy Rider Institution

A handwritten signature in black ink, likely belonging to the MD of Gram Tarang.

MD, Gram Tarang

CERTIFICATE of COMPLETION

This Certificate is awarded to

JYOTIRMOY DAS

Has successfully Completed 6 Weeks Virtual Internship on
“INDUSTRIAL CAD WITH CATIA & SIMENS NX”
held from **11th June 2021** to **30th July 2021**



An ISO 9001:2015, ISO 29990:2000
CERTIFIED COMPANY

Certificate No- SRI-OT01-2144054

Date - 13th Aug 2021



Chief Executive Officer
Skyy Rider Institutions Pvt Ltd.



इंडियन ऑयल कॉर्पोरेशन लिमिटेड

रिफाइनरीज प्रभाग: गुवाहाटी रिफाइनरी
नूनमाटी, गुवाहाटी - ७८१०२० (असम)

Indian Oil Corporation Limited

Refineries Division : Guwahati Refinery
Noonmati, Guwahati - 781020, Assam.
Fax : 0361-2657250, 2657251
EPABX : 0361-2597000
Website : www.iocl.com
E-mail id : GR@indianoil.in



IndianOil



Guwahati Refinery

रिफाइनरीज प्रभाग Refineries Division

To Whom It May Concern

This is to certify that **RISHAV DUTTA PURKAYASTHA** (2021001139) a student of 6th Semester in B. Tech. in MECHANICAL ENGINEERING from TEZPUR UNIVERSITY, TEZPUR, ASSAM has undertaken virtual internship at Indian Oil Corporation Limited, Guwahati Refinery from 15-07-2021 to 15-08-2021.

During the internship, he/ she has been found to be punctual and diligent. After completion of the internship, he/ she has submitted an Industrial Training/Project Report at Indian Oil Corporation Limited, Guwahati Refinery.

We wish him/ her all success in life.

Project Name: **Overview of Guwahati Refinery and various Rotatory and Static equipments used**

Project Guide: Mr. Diptesh Marndi, SMLE

Date: 15-09-2021

Place: Guwahati Refinery

Debanuja Borah
Ms. Debanuja Borah

Manager (L & D)

देबानुजा बोरा/ Debanuja Borah

प्रबंधक (एल स्वं डी)

Manager (L&D)

आई ओ सी एल, गुवाहाटी रिफाइनरी, नूनमाटी, गुवाहाटी-२०
IOCL, Guwahati Refinery, Noonmati, Guwahati-20



रिफाइनरीज प्रभाग
Refineries Division

इंडियन ऑयल कॉर्पोरेशन लिमिटेड

रिफाइनरीज प्रभाग: गुवाहाटी रिफाइनरी

नूनमाटी, गुवाहाटी-७८१०२० (असम)

Indian Oil Corporation Limited

Refineries Division : Guwahati Refinery

Noonmati, Guwahati-781020, Assam

Fax : 0361-2657250, 2657251

EPABX : 0361-2597000

Website : www.iocl.com

E-mail id : GR@indianoil.com



Indian Oil



Guwahati Refinery

To Whom It May Concern

This is to certify that **Satyajit Borah**(2021001161), a student of 6th Semester in B. Tech in Mechanical Engineering from SCHOOL OF ENGINEERING, TEZPUR UNIVERSITY, Sonitpur, Assam has undertaken internship at Indian Oil Corporation Limited, Guwahati Refinery from 15-07-2021 to 29-08-2021

During the internship, he/ she has been found to be punctual and diligent. After completion of the internship, he/ she has submitted an Industrial Training/Project Report at Indian Oil Corporation Limited, Guwahati Refinery.

We wish him/ her all success in life.

Project Name: Project Management at Guwahati Refinery

Project Guide: Mr. Birendra Kr Jha, M(TPM)

Date: 23-09-2021

Place: Guwahati Refinery

Debanuja Borah

Ms. Debanuja Borah
Manager (L & D)

देबानुजा बोरा/ Debanuja Borah

प्रबंधक (एल स्व. डी)

Manager (L&D)

आई ओ सी एल, गुवाहाटी रिफाइनरी, नूनमाटी, गुवाहाटी-२०
IOCL, Guwahati Refinery, Noonmati, Guwahati-20



रिफाइनरीज प्रभाग
Refineries Division

इंडियन ऑयल कॉर्पोरेशन लिमिटेड

रिफाइनरीज प्रभाग: गुवाहाटी रिफाइनरी

नूनमाटी, गुवाहाटी-७८१०२० (असम)

Indian Oil Corporation Limited

Refineries Division : Guwahati Refinery

Noonmati, Guwahati-781020, Assam

Fax : 0361-2657250, 2657251

EPABX : 0361-2597000

Website : www.iocl.com

E-mail id : GR@indianoil.com



Indian Oil



Guwahati Refinery

To Whom It May Concern

This is to certify that **Satyajit Borah**(2021001161), a student of 6th Semester in B. Tech in Mechanical Engineering from SCHOOL OF ENGINEERING, TEZPUR UNIVERSITY, Sonitpur, Assam has undertaken internship at Indian Oil Corporation Limited, Guwahati Refinery from 15-07-2021 to 29-08-2021

During the internship, he/ she has been found to be punctual and diligent. After completion of the internship, he/ she has submitted an Industrial Training/Project Report at Indian Oil Corporation Limited, Guwahati Refinery.

We wish him/ her all success in life.

Project Name: Project Management at Guwahati Refinery

Project Guide: Mr. Birendra Kr Jha, M(TPM)

Date: 23-09-2021

Place: Guwahati Refinery

Debanuja Borah

Ms. Debanuja Borah
Manager (L & D)

देबानुजा बोरा/ Debanuja Borah

प्रबंधक (एल स्व. डी)

Manager (L&D)

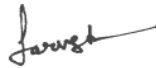
आई ओ सी एल, गुवाहाटी रिफाइनरी, नूनमाटी, गुवाहाटी-२०
IOCL, Guwahati Refinery, Noonmati, Guwahati-20

Certificate of Training

PADALA KIRAN KUMAR

from TEZPUR UNIVERSITY has successfully completed a 6-week online training on **AutoCAD 3D**. The training consisted of Introduction to AutoCAD 3D, Solid Modeling, Surface Modeling, Mesh Modeling, Create a 3D House, Rendering, and Mechanical modules.

We wish PADALA KIRAN all the best for future endeavours.



Sarvesh Agarwal
FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-08-16

Certificate no. : 0312A27E-7D4B-9127-D768-8632E6075003

For certificate authentication, please visit https://trainings.internshala.com/verify_certificate

CERTIFICATE NO : GT/SR/215913

DATE : 13th Aug 2021



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CERTIFICATE

OF COMPLETION

This is to certify that

Urniv Raj Deka

Has successfully Completed 6 Weeks Virtual Internship on
“INDUSTRIAL CAD WITH CATIA & SIMENS NX”

held from 11th June 2021 to 30th July 2021



Skill India
कौशल भारत - कुशल भारत

A handwritten signature in black ink, likely belonging to the CEO of Skyy Rider Institution.

CEO, Skyy Rider Institution

A handwritten signature in black ink, likely belonging to the MD of Gram Tarang.

MD, Gram Tarang

CERTIFICATE of COMPLETION

This Certificate is awarded to

Urniv Raj Deka

Has successfully Completed 6 Weeks Virtual Internship on
“INDUSTRIAL CAD WITH CATIA & SIMENS NX”
held from **11th June 2021** to **30th July 2021**



An ISO 9001:2015, ISO 29990:2000
CERTIFIED COMPANY

Certificate No- SRI-OT01-2144058

Date - 13th Aug 2021



Chief Executive Officer
Skyy Rider Institutions Pvt Ltd.



रिफाइनरीज प्रभाग
Refineries Division

इंडियन ऑयल कॉर्पोरेशन लिमिटेड

रिफाइनरीज प्रभाग: गुवाहाटी रिफाइनरी

नूनमाटी, गुवाहाटी-७८१०२० (असम)

Indian Oil Corporation Limited

Refineries Division : Guwahati Refinery

Noonmati, Guwahati-781020, Assam

Fax : 0361-2657250, 2657251

EPABX : 0361-2597000

Website : www.iocl.com

E-mail id : GR@indianoil.com



Indian Oil



Guwahati Refinery

To Whom It May Concern

This is to certify that **MOUSUM RAJ SONOWAL**(2021001059) a student of 6th Semester in B. Tech in MECHANICAL ENGINEERING from TEZPUR UNIVERSITY, TEZPUR, ASSAM has undertaken virtual internship at Indian Oil Corporation Limited, Guwahati Refinery from 15-07-2021 to 30-08-2021.

During the internship, he/ she has been found to be punctual and diligent. After completion of the internship, he/ she has submitted an Industrial Training/Project Report at Indian Oil Corporation Limited, Guwahati Refinery.

We wish him/ her all success in life.

Project Name: OVER VIEW OF GUWAHATI REFINERY AND STUDY OF VARIOUS EQUIPMENTS

Project Guide: Mr. Amit Raj, SMLE

Date:11-10-2021

Place: Guwahati Refinery


Mr. S.Prabu

Senior Manager (MS,L&D)

एस. प्रभु/S.Prabu

वरिष्ठ प्रबंधक (प्रबंधन सेवा,अध्ययन एवं विकास)
Senior Manager (MS,L&D)

आई ओ सी एल,गुवाहाटी रिफाइनरी,नूनमाटी,गुवाहाटी-२०
IOCL,Guwahati Refinery,Noonmati,Guwahati-20



इंडियन ऑयल कॉर्पोरेशन लिमिटेड

रिफाइनरीज प्रभाग: गुवाहाटी रिफाइनरी
नूनमाटी, गुवाहाटी - ७८१०२० (असम)

Indian Oil Corporation Limited

Refineries Division : Guwahati Refinery
Noonmati, Guwahati - 781020, Assam.
Fax : 0361-2657250, 2657251
EPABX : 0361-2597000
Website : www.iocl.com
E-mail id : GR@indianoil.in



IndianOil



Guwahati Refinery

रिफाइनरीज प्रभाग Refineries Division

To Whom It May Concern

This is to certify that **HIMAKSHI BAISHYA** (2021001127) a student of 6th Semester in B. Tech. in MECHANICAL ENGINEERING from TEZPUR UNIVERSITY, TEZPUR, ASSAM has undertaken virtual internship at Indian Oil Corporation Limited, Guwahati Refinery from 16-07-2021 to 20-08-2021.

During the internship, he/ she has been found to be punctual and diligent. After completion of the internship, he/ she has submitted an Industrial Training/Project Report at Indian Oil Corporation Limited, Guwahati Refinery.

We wish him/ her all success in life.

Project Name: REPORT ON VARIOUS MECHANICAL COMPONENTS, BEARING AND LUBRICATION USED IN INDIAN OIL CORPORATION LIMITED, GUWAHATI REFINERY.

Project Guide: Mr. R K Linda, SM(MS,L&D)

Date: 13-09-2021

Place: Guwahati Refinery

Debanuja Borah

Ms. Debanuja Borah

Manager (L & D)

देबानुजा बोरा/ Debanuja Borah
प्रबंधक (एल स्वं डी)
Manager (L&D)

आई ओ सी एल, गुवाहाटी रिफाइनरी, नूनमाटी, गुवाहाटी-२०
IOCL, Guwahati Refinery, Noonmati, Guwahati-20



रिफाइनरीज प्रभाग
Refineries Division

इंडियन ऑयल कॉर्पोरेशन लिमिटेड

रिफाइनरीज प्रभाग: गुवाहाटी रिफाइनरी

नूनमाटी, गुवाहाटी-७८१०२० (असम)

Indian Oil Corporation Limited

Refineries Division : Guwahati Refinery

Noonmati, Guwahati-781020, Assam

Fax : 0361-2657250, 2657251

EPABX : 0361-2597000

Website : www.iocl.com

E-mail id : GR@indianoil.com



Indian Oil



Guwahati Refinery

To Whom It May Concern

This is to certify that **SRINJOY DE JOARDAR** (2021001040) a student of 6th Semester in B. Tech. in Mechanical Engineering from TEZPUR UNIVERSITY, ASSAM has undertaken virtual internship at Indian Oil Corporation Limited, Guwahati Refinery from 15-07-2021 to 29-08-2021.

During the internship, he/ she has been found to be punctual and diligent. After completion of the internship, he/ she has submitted an Industrial Training/Project Report at Indian Oil Corporation Limited, Guwahati Refinery.

We wish him/ her all success in life.

Project Name: PIPING IN PETROLEUM INDUSTRY

Project Guide: Mr. Dipankar Das, (SPJM)

Date: 30-08-2021

Place: Guwahati Refinery

Debanuja Borah

Ms. Debanuja Borah

Manager (L & D)

देबानुजा बोरा/ Debanuja Borah

प्रबंधक (एल स्वं डी)

Manager (L&D)

आई ओ सी एल, गुवाहाटी रिफाइनरी, नूनमाटी, गुवाहाटी-२०
IOCL, Guwahati Refinery, Noonmati, Guwahati-20



30th September 2021

TO WHOMSOEVER IT MAY CONCERN

This is to certify that AADIPTA GHOSH, student of Tezpur university, Tezpur, undergoing BE/B.Tech specializing in Mechanical Engineering, has completed his 8 Weeks Internship Project on 'Service Excellence for SG Assured Processors' as part of our SG Next Program between 2nd August 2021 to 27th September 2021.

In addition to the Internship Program, the intern was also trained on Environment, Health and Safety (EHS) Practices, Survey Methodologies and Product knowledge.

During the Internship period, he showed keen enthusiasm, inquisitiveness to learn and zeal to perform.

We wish him success in all future endeavors.

Pugalenthil M
Team Leader – Human Resources (IA)

Saint-Gobain India Private Limited - Glass Business

Registered Office : Level 7, Sigapi Aachi Building, 18/3 Rukmani Lakshmi pathy Road, Egmore, Chennai - 600 008
Ph: +91 - 44 - 4593 6000 | Fax: +91 - 44 - 4593 6008 | www.in.saint-gobain-glass.com | CIN: U26109TN1997PTC037875
Factory : World Glass Complex, Plot No A-1, SIPCOT Industrial Park, Sriperumbudur - 602 105. Tamilnadu. India.
Tel : +91-44-2716 2832 to 39 | Fax : +91-44-2716 2845 | www.in.saint-gobain-glass.com



इंडियन ऑयल कॉर्पोरेशन लिमिटेड

रिफाइनरीज प्रभाग: गुवाहाटी रिफाइनरी
नूनमाटी, गुवाहाटी - ७८१०२० (असम)

Indian Oil Corporation Limited

Refineries Division : Guwahati Refinery
Noonmati, Guwahati - 781020, Assam.
Fax : 0361-2657250, 2657251
EPABX : 0361-2597000
Website : www.iocl.com
E-mail id : GR@indianoil.in



IndianOil



Guwahati Refinery

रिफाइनरीज प्रभाग Refineries Division

To Whom It May Concern

This is to certify that **RIKIRAJ BAISHYA** (2021001128) a student of 6th Semester in B. Tech. in MECHANICAL ENGINEERING from TEZPUR UNIVERSITY, TEZPUR, ASSAM has undertaken virtual internship at Indian Oil Corporation Limited, Guwahati Refinery from 16-07-2021 to 20-08-2021.

During the internship, he/ she has been found to be punctual and diligent. After completion of the internship, he/ she has submitted an Industrial Training/Project Report at Indian Oil Corporation Limited, Guwahati Refinery.

We wish him/ her all success in life.

Project Name: REPORT ON VARIOUS DEVICES, BEARING AND LUBRICATION USED IN INDIAN OIL CORPORATION LIMITED, GUWAHATI REFINERY.

Project Guide: Mr. R K Linda, SM(MS,L&D)

Date: 13-09-2021

Place: Guwahati Refinery

Debanuja Borah
Ms. Debanuja Borah

Manager (L & D)

देबानुजा बोरा/ Debanuja Borah
प्रबंधक (एल स्वी डी)
Manager (L&D)

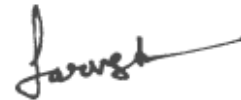
आई ओ सी एल, गुवाहाटी रिफाइनरी, नूनमाटी, गुवाहाटी-२०
IOCL, Guwahati Refinery, Noonmati, Guwahati-20

Certificate of Training

Naga Surendra Pandillapalle

from Tezpur University has successfully completed an 8-week online training on **Ansys**. The training consisted of Introduction to Finite Element Analysis (FEA), Understanding Concepts at Work & Installing Ansys, Introduction to Ansys Software, Static Structural Analysis, Modal, Thermal, & Buckling Analysis, Case Studies, and Final Project modules.

We wish Naga Surendra all the best for future endeavours.



Sarvesh Agarwal

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-11-06

Certificate no. : E2F964EF-2893-0DFE-BDA3-517E230D52A9

For certificate authentication, please visit https://trainings.internshala.com/verify_certificate

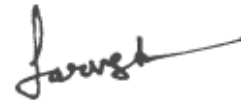
Certificate of Training

Kapil Hazarika

from Tezpur University has successfully completed an 8-week online training on **Ansys**. The training consisted of Introduction to Finite Element Analysis (FEA), Understanding Concepts at Work & Installing Ansys, Introduction to Ansys Software, Static Structural Analysis, Modal, Thermal, & Buckling Analysis, Case Studies, and Final Project modules.

Kapil is a top performer in the training.

We wish Kapil all the best for future endeavours.



Sarvesh Agarwal

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-10-13

Certificate no. : 100B9E75-F8FB-2777-CB24-D8C9E4B29C7E

For certificate authentication, please visit https://trainings.internshala.com/verify_certificate

Serial No. : 2288

Registration. No. : MTRTC/SRI/21-22/ANS0471



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Centurion University Campus | Alluri Nagar | R Sitapur | Uppalada | Parakhemundi | Gajapati | Odisha - 761211

Certificate of Achievement

This is to Certify that

Bhargab Boruah

has successfully completed the virtual training with project
on Advanced CAD Designing with

CATIA

held from **10th June 2021** to **8th July 2021**

Date of Certification : **22nd July 2021**

Program Manager

Mini Tool Room and Training Centre

Managing Director

GramTarang Employability Training Services

CERTIFICATE of COMPLETION

This Certificate is awarded to

Sasankajit Dihingia

Has successfully Completed Four Weeks Virtual Internship on

“CATIA”

held from **10th June 2021 to 8th July 2021**



An ISO 9001:2015, ISO 29990:2000
CERTIFIED COMPANY

Certificate No- SRI-OT01-2143823

Date - 22nd July 2021

Chief Executive Officer
Skyy Rider Institutions Pvt Ltd.