CHEMICAL ENGINEERING

NAAC 2021

Annexure 1

Annexure 1.1.1 & 1.3.4

Annexure 1.1.1

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY: PATIALA

(Department of Chemical Engineering)

UTA037: ARTIFICIAL INTELLIGENCE

L	T	P	Cr
3	0	2	4.0

Introduction to Artificial Intelligence

Overview: Definition, scope, foundations, approaches, and applications of AI; AI: past, present, and future.

Agents and Environments: agents; rationality; types of agents; properties of environments.

Problem Solving using Search

State Space Representation: State and operators; state space; representation real world problems as state space, problem characteristics.

Searching Strategies: uninformed searching methods (DFS, BFS, DFS-ID); informed searching methods (best first search, hill climbing, A*, iterative deepening A*); problem reduction; constraint satisfaction problems; neural, stochastic, and evolutionary algorithms.

Game Playing: Turn-taking games; Adversarial search; Minimax principle; Alpha-Beta pruning.

Reasoning and Uncertainty

Reasoning: Representation, Inference, Propositional Logic, predicate logic (first order logic), logical reasoning, forward chaining, backward chaining.

Dealing with uncertainty: probability, connection to logic, independence, Bayes rule, Bayesian networks, probabilistic inference; Decision making- Utility theory, utility functions, Decision theoretic expert systems.

Machine Learning

Introduction: Well-Posed learning problems, Basic concepts, Designing a learning system,Issues in machine learning. Types of machine learning, Generalization, Underfitting, overfitting, Cross-validation

Supervised Learning: Regression and Classification, Linear models (Linear regression, mixtures of Gaussians, logistic regression, perceptron, support vector machines), Non-linear models (non-

linear basis functions, kernel methods, deep neural networks), Ensemble Learning (Bagging, Boosting, Voting).

Unsupervised Learning: Clustering, k-means, hierarchal clustering methods.

Evaluation scheme

Sr. No.	Evaluation Elements	Weightage (%)
1.	MST	25
2.	EST	45
3.	Sessional (May include Assignments/ Quiz/Lab evaluations)	30

PROGRAM OUTCOMES (POs)

1. PO1: **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. PO2: **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. PO3: **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. PO4: **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis, and interpretation of data, and synthesis of the information to provide valid conclusions.
5. PO5: **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. PO6: **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. PO7: **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. PO8: **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. PO9: **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. PO10: **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. PO11: **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. PO12: **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

The students of undergraduate program in Chemical Engineering will have:

1. PSO1: **Core competence**: Basic knowledge of chemical engineering principles including unit operations, thermodynamics and reaction engineering.
2. PSO2: **Application competence**: Ability to analyse, design and control chemical processes in an economical and sustainable manner.

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(Department of Chemical Engineering)

UTA037: ARTIFICIAL INTELLIGENCE

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Annexure 1.3.4

TOKYO GAS

Tokyo Gas Co., Ltd.
1-5-20, Kaigan, Minato-ku, Tokyo
105-8527, Japan
Tel: +81-80-2684-5310
E-mail: nfuji@tokyo-gas.co.jp

TO WHOM IT MAY CONCERN

This is to certify that Ms. Ditikshya Sahoo, University Roll No. 1001701004 student of Thapar Institute of Technology, has completed her Internship in Tokyo Gas from 28th October 2020 to 15th January 2021.
The topic of project is " Data visualization of the effect of Carbon dioxide emission due to crowding in a workspace " and its designation is Data Analyst Intern.

During her internship with us, she worked very well above our expectation. She fully understood our needs and gave us a lot of suggestion about the theme.
We wish her good luck for her future endeavors.

Naohiko Fujiwara

Name: Mr. Naohiko Fujiwara
Title: Manager,
Tokyo Gas Co., Ltd.
Date: 27th January, 2021

Prashikshan -2020

SHAVAK NANAVATI TECHNICAL INSTITUTE

An ISO 9001:2015 Organization

CERTIFICATE

This is to certify that Anwesha Dastidar (Reg. No. VT20203542),
Student of THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY,
has undergone Vocational Training Program at Tata Steel Ltd., Jamshedpur from
15-July ,2020 *to* 30-December ,2020. *The details of the programme are as under:*

Department Covered	QUALITY ASSURANCE
Project Title	DEEPER UNDERSTANDING OF GALVANEALED PRODUCT AND ITS DEFECTS IN CGL 2

He/She has successfully completed the Programme

Ammi kumari

Place : Jamshedpur
Date : 25-01-2021
Ref No : VT20203542

Coordinator
Vocational Training
Tata Steel Ltd

SHAVAK NANAVATI TECHNICAL INSTITUTE, TATA STEEL LTD, N-ROAD, BISTUPUR, JAMSHEDPUR – 831001,
Telephone: 91-657-2320243, Fax: 91-657-2320243, E-mail- snit.office@tatasteel.com

CERIFICATE

This is to certify that the Project Report on "**Synthesis and Optimization Process for High Density and High Energy Fuel "** being submitted by Siddharth Pandey, student of B.Tech final year (Chemical Engineering) of Thapar Institute of Engineering and Technology, Patiala, is a record of his original work carried out under our supervision and guidance during his project semester from 10th Aug 2020 to 20th Jan 2021.

Mr.R.K.Jain

Scientist 'F' / Head PDSU

PDSU Division

Defence Materials & Stores Research & Development Establishment

(D.M.S.R.D.E.)

Defence Research & Development Organization

(D.R.D.O.)

G.T. Road, Kanpur-208013.

No. CFEES/HRG/V.TRG/CERTIFICATE/ 1493
रक्षा मंत्रालय, डीआरडीओ
Min. of Defence, DRDO
अग्नि, विस्फोटक और पर्यावरण सुरक्षा केंद्र
Centre for Fire, Explosive & Environment Safety, (CFEES)
ब्रिग. एस. के मजूमदार मार्ग, तिमारपुर
Brig. S. K. Mazumdar Marg, Timarpur
दिल्ली ११० ०५४
Delhi - 110054

ISO 9001: 2015

Dated: 12/1/21

CERTIFICATE

This is to certify that **Mr. Shantanu Singh (101701022)** of **Thapar Institute of Engineering and Technology** has undergone his five months training at **Centre for Fire, Explosive and Environment Safety (CFEES), Defence Research & Development Organization (DRDO)**, Timarpur, New Delhi-110054 from 5th August 2020 to 5th January 2021 During this training, he worked on the project ***Treatment of Explosive Industry Wastewater by Aerobic Granular Sludge Method*** under the guidance of Dr. S. Mary Celin, Sc F.

We wish him a great and successful future.

Shri R.K Tanvar
Scientist "G"
Associate Director (MS&ESRG)
CFEES

(Dr. Meenakshi Gupta)
Scientist "G"
Associate Director (TCP&HR)
CFEES

Inspired REACH
ONE STOP SHOP FOR ALL YOUR ADVERTISING NEEDS

Suite - 402, MJ Towers, Road -12, Banjara Hills - 500034
GSTIN - 36AAEFI9170M1ZV, PAN - AAEFI19170M

Certificate Of Completion

This Certifies that

Aahan Khandelwal

has completed **Graphic Designer Internship** at **Creative Whoop,** a digital wing for **Inspired Reach** from **1st August, 2020** to **31st December, 2020.**We found him sincere,hardworking, dedicated and result oriented.He worked well as a part of the team during his tenure.

We take this opportunity to thank him and wish him all the best for his future endeavors.

Awarded this January 04th, 2021

Harapriya Debata

HR Manager

Inspired REACH
ONE STOP SHOP FOR ALL YOUR ADVERTISING NEEDS

Suite - 402, MJ Towers, Road -12, Banjara Hills - 500034
GSTIN - 36AAEFI9170M1ZV, PAN - AAEFI19170M

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Awarded this January 04th, 2021

Harapriya Debata

HR Manager

TEJ International Pvt. Ltd.

(9001 : 2015, ISO 14001 : 2015, OHSAS 18001 : 2007, BSCI & SA 8000 : 2014)

10th-11th Mile Stone ● Agra-Mathura Road ●
Artoni ● Agra 282 007 ● INDIA

Phone : +91-9927017200, 7535021717
e-mail : export@tejgroupindia.com

CIN-U19112DL1984PTC345260

TEJ GROUP

Date: 22.01.2021

TO WHOM SOEVER IT MAY CONCERN

This is to certify that Mr. PRADYUMAN PRATAP CHAUDHARY of Chemical Branch from THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY has completed 05 months internship from 22.08.2020 to 22.01.2021.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeds our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

For Tej International Pvt. Ltd.

For Tej International Pvt. Ltd.

Devendra Chaudhary
Manager - HRD

(Devendra Chaudhary)
Manager-HRD

Cc: Admin. Deptt (for Training Record)

TEJ International Pvt. Ltd.

(9001 : 2015, ISO 14001 : 2015, OHSAS 18001 : 2007, BSCI & SA 8000 : 2014)

10th-11th Mile Stone ● Agra-Mathura Road ●
Artoni ● Agra 282 007 ● INDIA

Phone : +91-9927017200, 7535021717
e-mail : export@tejgroupindia.com

CIN-U19112DL1984PTC345260

TEJ GROUP

Date: 22.01.2021

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For Tej International Pvt. Ltd.

For Tej International Pvt. Ltd.

Devendra Chaudhary
Manager - HRD

(Devendra Chaudhary)
Manager-HRD

Cc: Admin. Deptt (for Training Record)

CERTIFICATE FROM THE INDUSTRY

This is to certify that **Miss Swadha Arora,** a student of **Thapar Institute of Engineering Technology, Patiala** has been a part of **Qwikky's** internship program from September 1, 2020 lasting upto 15th January,2021.

Miss Arora has joined as a business developer and has taken up the duties and responsiblilties in her capacity .

Qwikky

For Qwikky

Rakesh Kakkar
Founder & CEO

SUNBEAM
LIGHTWEIGHTING SOLUTIONS PVT LTD.
UNIT-IV
(Formerly known as Novy Mir Lightweighting Solutions Pvt Ltd)
PLOT NO. 12 R –UNIT-IV INDUSTRIAL AREA – 'B', LUDHIANA – 141 003 (PUNJAB) INDIA
Telephone No. 0161-4177000 Fax No.0161-2535126
CIN : U29309HR2017PTC071709

Date-: 23-01-2021

TO WHOM IT MAY CONCERN

This is to certify that **Mr. Vasu jain** s/o **Sh. Sunil Jain** University Roll No. 101751001 Student of Bachelor of Technology in **(Chemical Engineering)** 7th Semester of **Thapar Institute of Engineering and technology, Patiala** has completed his Industrial Training from 04th Aug, 2020 to 15th Jan, 2021.

During his training with us he has shown keen interest to the job assigned to him and has been indefatigable at work.

We wish him all the best for his future endeavours.

For **Sunbeam Lightweighting Solutions Pvt. Ltd. (Unit IV)**

Authorised Signatory

Registered Office
38/6 KM Stone, Delhi Jaipur Highway, Narsingpur, Gurgaon, Haryana 122001
Email id: novymirlightweighting@gmail.com Contact – 6155 8000

Ambuja Cement

ACL:BAT:PERS:2020 **Dated: 5 January, 2021**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms. Chavi Sharma** student of 4th Year B.E Chemical Engineering at Thapar Institute of Engineering and Technology, Patiala, Punjab, has undergone industrial training in our organization from 01st Aug, 2020 to 31st December 2020.

She has successfully completed her Project (Grinding unit optimization using grinding aid). We wish her every success in her future endeavors.

For Ambuja Cements Limited

For AMBUJA CEMENT LTD.
UNIT BATHINDA
05/01/2021
Authorised Signatory

Umesh Kumar
Head HR

No. CFEES/HRG/V.TRG/CERTIFICATE/ 1490
रक्षा मंत्रालय, डीआरडीओ
Min. of Defence, DRDO
अग्नि, विस्फोटक और पर्यावरण सुरक्षा केंद्र
Centre for Fire, Explosive & Environment Safety, (CFEES)
ब्रिग. एस. के मजूमदार मार्ग, तिमारपुर
Brig. S. K. Mazumdar Marg, Timarpur
दिल्ली - ११० ०५४
Delhi - 110054

ISO 9001: 2008

Dated: 05/01/2021

CERTIFICATE

This is to certify that **Mr. Karan Kapur(101701010)** of **Thapar Institute of Engineering and Technology** has undergone his five months training at **Centre for Fire, Explosive and Environment Safety (CFEES), Defence Research & Development Organization (DRDO)**, Timarpur, New Delhi-110054 from 5th August 2020 to 5th January 2021. During this training, he worked on the project **"Thermal Management of Condensed Aerosol based Fire Extinguishing System"** under the guidance of Dr. Amit Saxena, Scientist 'E'.

We wish him a great and successful future.

AD, FC&HB
CFEES, DRDO

(Dr. Meenakshi Gupta)
Scientist "G"
Associate Director (TCP&HR)
CFEES

No. CFEES/HRG/V.TRG/CERTIFICATE/ 1491
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Brig. S. K. Mazumdar Marg, Timarpur
दिल्ली - ११० ०५४
Delhi - 110054

ISO 9001: 2008

Dated: 5/01/2021

CERTIFICATE

This is to certify that **Mr. Rishabh Ranade (101701019)** of **Thapar Institute of Engineering and Technology** has undergone his five months training at **Centre for Fire, Explosive and Environment Safety (CFEES)**, **Defence Research & Development Organization (DRDO)**, Timarpur, New Delhi-110054 from 5th August 2020 to 5th January 2021 During this training, he worked on the project "***Evaluation of Degradation Methodologies of Nanomaterials***" under the guidance of Dr. Shalini Anand. We wish him a great and successful future.

05/01/2021
AD, ENSG
CFEES, DRDO

(Dr. Meenakshi Gupta)
Scientist "G"
Associate Director (TCP&HR)
CFEES

InterviewBit Software Services LLP
436 Amanora Chambers Amanora Park Town
Hadapsar Pune- 411028
LLP IN : AAE-3484

INTERNSHIP CERTIFICATE

Date: 19th Jan 2021

This is to certify that **Swasti Jain** (Emp Code : 1350) has worked as an **Operations Intern** in our company from 7 October 2020 to 6 January 2021.

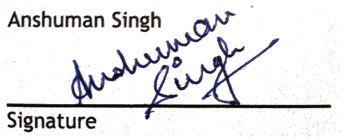
Please find the internship details below:

Company Name: InterviewBit Software Services LLP
Location: Bangalore
Department: Operations
Designation: Operations Intern

During her working period, we found her to be a sincere and dedicated intern with a professional attitude and very good knowledge of the job.

We thank her for the efforts and contribution and wish all the best in her future endeavours.

Yours Sincerely



Partner, InterviewBit Software Services LLP

Date- 18/01/2021

19A, HauzKhas Village, Lake Side,
HauzKhas,
New Delhi, Delhi 110017

Internship Certificate

This is to certify that Mr. Tarun Chachra has completed his Internship with our Business Development team starting from 21st July 2020 to 31st Dec 2020. During the Internship, we found him very hard working, responsible, honest with strong analytical ability in performing duties and tasks.

The management would like to certify that Tarun has completed all the tasks assigned to him during his internship.

With best wishes,

Authorized Signatory

Paras Varma - Human Resource

नाभिकीय औषधि तथा सम्बद्ध विज्ञान संस्थान
Institute of Nuclear Medicine & Allied Sciences
रक्षा अनुसंधान एवं विकास संगठन
Defence Research & Development Organization

ब्रिगेडियर एस के मजूमदार मार्ग, तिमारपुर, दिल्ली-११००५४, भारत
Brig SK Mazumdar Road, Timarpur, Delhi - 110 054, INDIA

प्रशिक्षण प्रमाण पत्र/Training Certificate

प्रमाणित किया जाता है कि श्री/~~श्रीमती~~/~~कुमारी~~ निश्चय डागर
एच आर पंजी. सं. 2020/298 जो कि थापर इंस्टीट्यूट ऑफ इंजीनियरिंग एंड टेक्नोलॉजी, पटियाला संस्थान
के बी. ई विषय केमिकल इंजीनियरिंग के छात्र/~~छात्रा~~ हैं। इन्होंने दिनांक 17.08.2020
से 17.01.2021 तक 5 सप्ताह/~~मॉह~~ का ग्रीष्मकालीन/~~शीतकालीन~~ प्रशिक्षण सफलतापूर्वक पूर्ण कर लिया है।

This is to certify that Mr./Ms. Nishchay Dagar HR Regd.No. 2020/298
student of Thapar Institute of Engineering and Technology, Patiala
Degree/Branch BE (Chemical Engineering) has completed Summer/~~Winter~~ internship successfully
for the period from 17.08.2020 to 17.01.2021 duration 5 ~~weeks~~/months.
इनके प्रशिक्षण का विषय/Topic of Internship was "Evaluation of Chemical Decontamination Efficacy of the Prepared Formulation" Online Training Under the guidance of Dr. Rajeev Gaur, Scientist 'E'
प्रशिक्षण के दौरान इनमास में इनका व्यवहार अच्छा रहा। During the training period his/her conduct at INMAS was good.

दिनांक/Date 21.01.2021

21/1/2021.
प्रमुख, मानव संसाधन/Head HR

Nectar Lifesciences Ltd.

NecLife

Ref. No. NLL/2021/TRG/003 Date: 23-Jan-2021

TO WHOM IT MAY CONCERN

This is to certify that **Mr. Varun Mohindra S/O Sh. Sandeep Mohindra** is a student of B.E. (Chemical) 4th Year from **Thapar Institute of Engineering & Technology, Patiala** has undergone Industrial Training from **07-Sep-2020 to 23-Jan-2021** in **Production** Department in our organization.

We wish him all the success for his future.

For **Nectar Lifesciences Ltd.**

For Nectar Lifescience Ltd.

Authorised Signatory

Rakesh Sharma

Asst.Manager - HR & Admin.

Corporate Office : S.C.O. 38-39, Sector 9-D, Chandigarh-160 009 (India) Tel. : +91-172-3047777 Fax : +91-172-3047755
E-mail : sales@neclife.com Website : www.neclife.com
CIN : L24232 PB1995 PLC 016664
Regd. Office & Works : Vill. Saidpura, Teh. Dera Bassi, Distt. Mohali (Punjab) Near Chandigarh (INDIA)
Tel. : +91-1762-308000, 308001 Fax : +91-1762-308135

ISO 9001:2008 Certified

Ambuja Cement

ACL:BAT:PERS:2020 **Dated: 5 January, 2021**

TO WHOMSOEVER IT MAY CONCERN

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For Ambuja Cements Limited

For AMBUJA CEMENT LTD.
UNIT BATHINDA
05/01/2021
Authorised Signatory

Umesh Kumar
Head HR

Duraton CEMENT
India's Most Advanced Cement

Asian Fine Cements Pvt. Ltd.
Manufacturing Unit
NH-1, Ambala-Ludhiana, Stretch,
Rajpura, Patiala 140 417, India
T / 1800 200 9988
E / info@duratoncement.com

Date 30/12/2020

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Paras Jain,** student of **Department of Chemical Engineering – Thapar Institute of Engineering & Technology, Patiala** has done his internship in **Production Department** at **Asian Fine Cements Pvt Ltd.** from 29th July, 2020 to 30th December, 2020. He has undergone training to understand the functions and responsibilities of the Production Process.

During the internship period, he demonstrated good analytical skills with a self-motivated attitude to learn new things. His performance exceeded the expectations and he was able to complete the internship training on time.

We wish him all the best for his future endeavours

FOR ASIAN FINE CEMENTS PVT LTD

ASIAN FINE CEMENTS PVT. LTD. TEH. RAJPURA DISTT. PATIALA (PUNJAB) 140417 VILL. PAT...

HR Head

(Abraham Jebaraj)

Ind-Swift Laboratories Limited

(A Recognised Export House)

Regd. Office : S.C.O. 850, Shivalik Enclave, NAC, Manimajra, Chandigarh - 160 101
Phones : ++ 91 - 172-2730503, 2730920, Fax + + 91 - 172 - 2730504, 2736294
E-mail : info@indswiftlabs.com Website : www.indswiftlabs.com
CIN No. L24232CH1995PLC015553

ISLL/HR/HO/TRAINEE/2021/01 **Date: 23.01.2021**

TO WHOM SOEVER IT MAY CONCERN

This is to certify that **Ms. Gaurangi** D/O Mr. Survesh Kumar a student of B.E. - Chemical Engineering of **Thapar Institute of Engineering & Technology, Patiala (Punjab)** has successfully completed her training in **Process Engineering** Department as a **Trainee** from 10th August 2020 to 9th January 2021.

In view of COVID related restrictions, the student learnt the basic details of "Manufacturing & Process Related Operations" through Online portals and Web Interactions with our relevant team members.

Further, during her training tenure we found her sincere & hardworking.

We wish her all the best for her future endeavors.

For Ind-Swift Laboratories Limited

Ind-Swift Laboratories Ltd. Manimajra Chandigarh SCO 850 NAC

Authorized Signatory

HR Department

UNDERTAKING

This is to certify that **Miss Anwesha Dastidar**, 4th year student pursuing B.E Chemical from Thapar Institute of Engineering & Technology has **completed** her 5 months internship (July-December) in **Tata Steel**, Jamshedpur by 15 December 2020 and the internship certificate will be issued to her latest by 31st March 2020

Arnab Dastidar

Mr. Arnab Dastidar

Manager, Quality Assurance

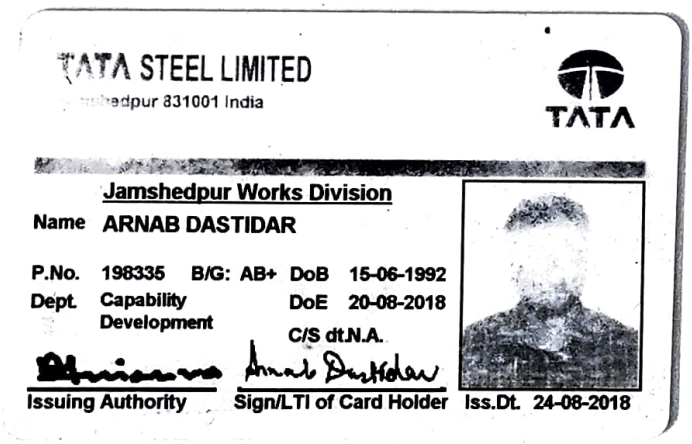
Tata Steel, Jamshedpur

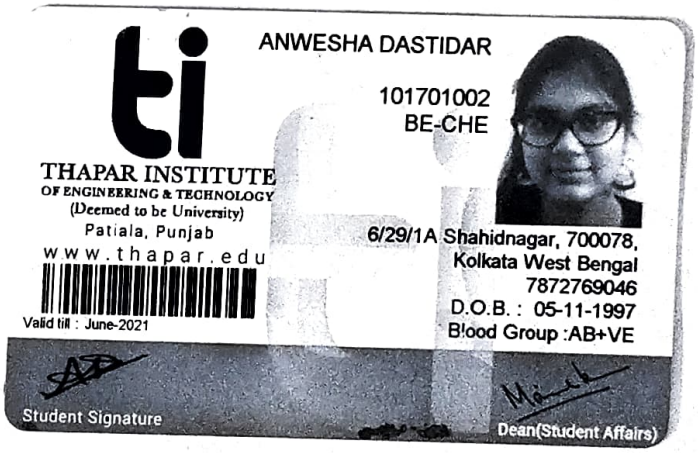
Mob- 7586811317

Email- arnab.dastidar@tatasteel.com

Anwesha Dastidar
101701002
B.E CHE (4th year)
TIET
Ref No - VT 2020 3542

Personal ID - 198 335

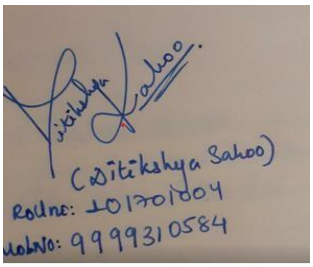




Undertaking

This is to notify that the certificate of completion of Internship of Ditikshya Sahoo ,101701004 , Department of Chemical Engineering , T.I.ET. at Tokyo Gas , Pvt ltd. , Japan is still under the processing .The submission of the afore mentioned will done as soon as the processing is completed .

Dated 6.01.2021



Signature of student

Signature of Mentor

PROJECT REPORT
(July–December 2020)
On

ESTIMATION OF THERMODYNAMIC PROPERTIES OF NON-IDEAL MULTICOMPONENT HYDROCARBON MIXTURE

Project report submitted in partial fulfilment of the requirement for the degree of B.E. (Chemical Engineering)

Submitted by
VAIBHAV TRIPATHI
101701027

Submitted to
Dr. Sudhir Kumar Singh
Associate Professor
Department of Chemical Engineering
Thapar Institute of Engineering and Technology

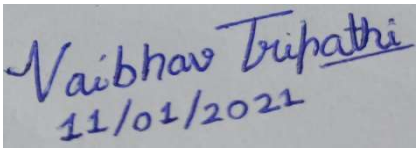
DEPARTMENT OF CHEMICAL ENGINEERING
THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY,
(Deemed to be University)
PATIALA, 147004, PANJAB, INDIA

January 2021

DECLARATION

I, **Vaibhav Tripathi**, hereby declare that the project work entitled "**Estimation of thermodynamic properties of non-ideal multicomponent hydrocarbon mixture**", submitted to the **Thapar Institute of Engineering & Technology, (Deemed to be University), Patiala (INDIA)**, in partial fulfilment of the requirement for the award of Degree of **Batchelor of Engineering in Chemical Engineering** is an authentic record of my own work carried out, during the period 20th July- 30th December 2020, under the supervision and guidance of Dr. Sudhir Kumar Singh, Associate Professor, Department of Chemical Engineering, Thapar Institute of Engineering and Technology, Patiala.

I declare that this written submission represents my ideas in my own words and where other's ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that this work has not been submitted elsewhere for a degree or diploma at this or any other higher education institute.



Date: 11-01-2021

(**VAIBHAV TRIPATHI**)

Roll No.: 101701027

Certified that the above statement made by the student is correct to the best of my knowledge and belief. I have checked all the requirements, formatting and other essential components of this report, and it is as per the guidelines and standards.

Sudhir Kr. Singh

(**Dr. Sudhir Kumar Singh**)

Associate Professor

Department of Chemical Engineering

Thapar Institute of Engineering & Technology, Patiala

PROJECT SEMESTER REPORT
(July–December 2020)
on

Tuning PID controller for three interacting tanks using Performance Criterion

Project semester report submitted in partial fulfillment of the requirement for the degree of
B.E. (Chemical Engineering)

Under the guidance of

Dr. Parminder Singh

Assistant Professor

Thapar Institute of Engineering and Technology

Submitted by

Gurmehak Inder Kaur Brar
(101701005)

Submitted to

Dr. Parminder Singh

THAPAR INSTITUTE
OF ENGINEERING & TECHNOLOGY
(Deemed to be University)

DEPARTMENT OF CHEMICAL ENGINEERING
THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
(Deemed to be University)
PATIALA, 147004, PANJAB, INDIA

January 2021

DECLARATION

I, **Gurmehak Inder Kaur Brar**, hereby declare that the project work entitled **" Tuning PID controller for three interacting tanks using Performance Criterion "**, submitted to the **Thapar Institute of Engineering & Technology, (Deemed to be University), Patiala (INDIA)**, in partial fulfilment of the requirement for the award of Degree of **Bachelor of Engineering in Chemical Engineering** is an authentic record of my own work carried out at **Thapar Institute of Engineering & Technology** during the period **July 2020-December 2020**, under the supervision and guidance of Dr. Parminder Singh, Assistant Professor, Thapar Institute of Engineering and Technology.

I declare that this written submission represents my ideas in my own words and where other's ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that this work has not been submitted elsewhere for a degree or diploma at this or any other higher education institute.

Date: 11.01.2021

Signature of the student

Gurmehak Inder Kaur Brar

Reg/Roll No.- 101701005

Certified that the above statement made by the student is correct to the best of my knowledge and belief. I have checked all the requirements, formatting and other essential components of this report and it is as per the guidelines and standards.

Signature of the faculty Mentor

Dr. Parminder Singh

Assistant Professor

Department of Chemical Engineering

Thapar Institute of Engineering Technology, Patiala

PROJECT REPORT

(August 2020–January 2021) on

Influence of Polyethylene Glycol in Polymeric Coatings

Project semester report submitted in partial fulfilment of the requirement for the degree of B.E. (Chemical Engineering)

Submitted By

Jasmeet Kaur Badwal

(101701008)

Submitted To

Dr. Sanjeev Ahuja

Associate Professor

DEPARTMENT OF CHEMICAL ENGINEERING

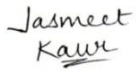
THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY (Deemed to be University) PATIALA, 147004, PUNJAB, INDIA

January 2021

DECLARATION

I, Jasmeet Kaur Badwal hereby declare that the project work entitled "Influence of Polyethylene Glycol in Polymeric Coatings**",** submitted to the Thapar Institute of Engineering & Technology, (Deemed to be University), Patiala (INDIA), in partial fulfilment of the requirement for the award of Degree of Bachelor of Engineering in Chemical Engineering is an authentic record of my own work carried out at TIET during the period September to December under the supervision and guidance of Dr. Sanjeev Ahuja I declare that this written submission represents my ideas in my own words and where other's ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that this work has not been submitted elsewhere for a degree or diploma at this or any other higher education institute.

Date: 12/01/2021 Signature of the student:



Roll No. -101701008

Certified that the above statement made by the student is correct to the best of my knowledge and belief. I have checked all the requirements, formatting and other essential components of this report and it is as per the guidelines and standards.

Signature of the mentor

Department of Chemical Engineering
Thapar Institute of Engineering &Technology
Patiala

PROJECT REPORT
(July–December 2020)
on

Optimization of activity coefficient models to describe vapour-liquid equilibrium mixtures using a particle swarm algorithm.

Project semester report submitted in partial fulfilment of the requirement for the degree of B.E. (Chemical Engineering)

Under the guidance of

Dr Parminder Singh
Associate Professor

T.I.E.T, Patiala

Submitted by

Himanshu Pal

(101701006)

Submitted to

Dr Parminder Singh

DEPARTMENT OF CHEMICAL ENGINEERING
THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
(Deemed to be University)
PATIALA, 147004, PANJAB, INDIA

January 2021

DECLARATION

I, Himanshu Pal**,** hereby declare that the project work entitled " **Optimization of activity coefficient models to describe vapour-liquid equilibrium mixtures using a particle swarm algorithm.** ", submitted to the Thapar Institute of Engineering & Technology, (Deemed to be University), Patiala (INDIA), in partial fulfilment of the requirement for the award of Degree of Batchelor of Engineering in Chemical Engineering is an authentic record of my work, during the period July 2020 to December 2020**,** under the supervision and guidance of Dr Parminder Singh with Associate Professor, Thapar Institute of Engineering & Technology**.**

I declare that this written submission represents my ideas in my own words and where other's ideas or words have been included, I have adequately cited and referenced the sources. I also declare that this work has not been submitted elsewhere for a degree or diploma at this or any other higher education institute.

Date: 11-Jan 2021

Signature of the student with the date

(**Himanshu Pal)**

Reg/Roll No. 101701006

Certified that the above statement made by the student is correct to the best of my knowledge and belief. I have checked all the requirements, formatting and other essential components of this report and it is as per the guidelines and standards.

(Dr. Parminder Singh)

Associate Professor

Department of Chemical Engineering Thapar Institute of Engineering & Technology, Patiala

PROJECT SEMESTER REPORT
(July–December 2020)

On

“Food Grade Films and Coatings”

Project semester report submitted in partial fulfilment of the requirement for the degree of B.E. (Chemical Engineering)

Under the guidance of
Dr. Avinash Chandra
Associate Professor
Chemical Engineering Department, TIET

Submitted by
Lakshya Saxena (101701011)
B. E Chemical (Final Year)

Submitted to
Dr. Avinash Chandra

DEPARTMENT OF CHEMICAL ENGINEERING
THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
(Deemed to be University)
PATIALA, 147004, PANJAB, INDIA
January 2020

DECLARATION

I, **LAKSHYA SAXENA**, hereby declare that the project work entitled "Food Grade Coatings", submitted to the **Thapar Institute of Engineering & Technology, (Deemed to be University), Patiala (INDIA)**, in partial fulfilment of the requirement for the award of degree of **Bachelor of Engineering in Chemical Engineering** is an authentic record of my own work carried out at Chemical Engineering Department, TIET Patiala during the period October 2020 to January, 2021; under the supervision and guidance of **Dr. Avinash Chandra, Associate Professor, Chemical Engineering Department, TIET.**

I declare that this written submission represents my ideas in my own words and where other's ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that this work has not been submitted elsewhere for a degree or diploma at this or any other higher education institute.

Date: 11th January, 2021 (**Lakshya Saxena**)

101701011

Certified that the above statement made by the student is correct to the best of my knowledge and belief. I have checked all the requirements, formatting and other essential components of this report and it is as per the guidelines and standards.

(**Dr. Avinash Chandra**)

Associate Professor, CHED

TIET. Patiala

PROJECT SEMESTER REPORT
(July–December 2020)

On

Parameter Optimization of Diode Model of Photovoltaic Cell Using Metaheuristic Algorithm

Project semester report submitted in partial fulfilment of the requirement for the degree of B.E. (Chemical Engineering)

Submitted by
Sagar Divyansh Khare
(**Roll No – 101881002)**

Submitted to
Dr. Parminder Singh
Assistant Professor
Department of Chemical Engineering

DEPARTMENT OF CHEMICAL ENGINEERING
THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
(Deemed to be University)
PATIALA, PUNJAB, INDIA. PIN-147004

January 2021

DECLARATION

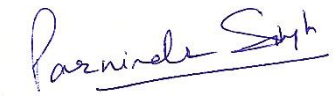
I, **Sagar Divyansh Khare**, hereby declare that the project work entitled "**Parameter Optimization of Diode Model of Photovoltaic Cell Using Metaheuristic Algorithm"**, submitted to the **Thapar Institute of Engineering & Technology, (Deemed to be University), Patiala (INDIA)**, in partial fulfilment of the requirement for the award of Degree of **Bachelor of Engineering in Chemical Engineering** is an authentic record of my own work carried out during the period **July 2020 to December 2020**, under the supervision and guidance of **Dr. Parminder Singh, Assistant Professor, Department of Chemical Engineering.**

I declare that this written submission represents my ideas in my own words and where other's ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that this work has not been submitted elsewhere for a degree or diploma at this or any other higher education institute.

Date: January 21, 2021

(Sagar Divyansh Khare)
Roll No. - 101881002

Certified that the above statement made by the student is correct to the best of my knowledge and belief. I have checked all the requirements, formatting and other essential components of this report and it is as per the guidelines and standards.



(Dr. Parminder Singh)
Assistant Professor
Department of Chemical Engineering
Thapar Institute of Engineering &
Technology, Patiala, Punjab.

PROJECT REPORT

(July–December 2020)

on

A THEORETICAL REVIEW ON CARBON DIOXIDE CAPTURE TECHNOLOGIES

Project report submitted in partial fulfillment of the requirement for the degree of B.E. (Chemical Engineering)

Under the guidance of
Mr. Rakesh Kumar Gupta
Assistant Professor
Chemical Engineering Department

Submitted by
Parul Gupta
101701016

Submitted to
Dr. Avinash Chandra

DEPARTMENT OF CHEMICAL ENGINEERING
THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
(Deemed to be University)
PATIALA, 147004, PUNJAB, INDIA

January 2021

DECLARATION

I, **Parul Gupta**, hereby declare that the project work entitled **" A Theoretical Review on Carbon Dioxide Capture Technologies",** submitted to the **Thapar Institute of Engineering & Technology, Patiala (INDIA)**, in partial fulfillment of the requirement for the award of Degree of **Bachelor of Engineering in Chemical Engineering** is an authentic record of my work carried out at **Thapar Institute of Engineering and Technology** during the period **July 2020- December 2020**, under the supervision and guidance of Mr. Rakesh Kumar Gupta, Assistant Professor, Department of Chemical Engineering. I declare that this written submission represents my ideas in my own words and where other's ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that this work has not been submitted elsewhere for a degree or diploma at this or any other higher education institute.

23-01-2021 (**Parul Gupta**)

101701016

Certified that the above statement made by the student is correct to the best of my knowledge and belief. I have checked all the requirements, formatting and other essential components of this report and it is as per the guidelines and standards.

(**Mr. Rakesh Kumar Gupta**)

Assistant Professor

Department of Chemical Engineering

Thapar Institute of Engineering & Technology, Patiala

PROJECT REPORT

(July – December 2020)

on

Designing of Sequencing Batch Reactor

Project semester report submitted in partial fulfilment of the requirement for the degree of B.E.(Chemical Engineering)

Under the guidance of

Dr.Jai Prakash Kushwaha

Professor

Thapar Institute Of Engineering And Technology
Patiala, Punjab

Submitted to

Dr.Jai Prakash Kushwaha

Submitted by

Yashasvi Mittal
(101701029)

DEPARTMENT OF CHEMICAL ENGINEERING
THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
(Deemed to be University)

PATIALA, 147004, PUNJAB, INDIA

January,2021

DECLARATION

I, **Yashasvi Mittal,** hereby declare that the project work entitled "**Designing of Sequencing Batch Reactor**" submitted to **Thapar Institute of Engineering & Technology, (Deemed to be University), Patiala (INDIA),** in partial fulfilment of the requirement for the award of Degree of **Bachelor of Engineering in Chemical Engineering** is an authentic record of my own work carried out at **Thapar Institute of Engineering & Technology** during the period **2nd October 2020 to 31st December 2020** under the supervision and guidance of **Dr. Jai Prakash Kushwaha, Associate Professor, Thapar Institute of Engineering & Technology.**

I declare that this written submission represents my own ideas and wherever the ideas of others are included, it has been adequately cited with the original source of reference. I also declare that this work has not been submitted elsewhere for a degree or diploma at this or any higher education institute.

(Yashasvi Mittal)
Roll Number: 101701029

Certified that the above statement made by the student is correct to the best of my knowledge and belief. I have checked all the requirements, formatting and other essential components of this report and it is as per the guidelines and standards.

(Dr. Jai Prakash Kushwaha)
Associate Professor
Department of Chemical Engineering
Thapar Institute of Engineering & Technology
Patiala

PROJECT SEMESTER REPORT
(July–December 2020)
on

To validate the experimental VLE data for Isopropanol - Water azeotropic system using thermodynamic models

Project semester report submitted in partial fulfilment of the requirement for the degree of B.E. (Chemical Engineering)

Submitted by
Shourya Singh
(101701023)

Submitted to
Dr. Neetu Singh

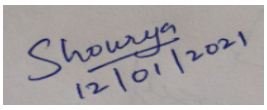
DEPARTMENT OF CHEMICAL ENGINEERING
THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
(Deemed to be University)
PATIALA, 147004, PANJAB, INDIA

January 2021

DECLARATION

I, **Shourya Singh**, hereby declare that the project work entitled **"To validate the experimental VLE data for Isopropanol - water azeotropic system using thermodynamic models"**, submitted to the **Thapar Institute of Engineering & Technology, (Deemed to be University), Patiala (INDIA)**, in partial fulfilment of the requirement for the award of Degree of **Batchelor of Engineering in Chemical Engineering** is an authentic record of my own work carried out during the period **July – December 2020**, under the supervision and guidance of Dr. Neetu Singh(T.I.E.T.)**.**

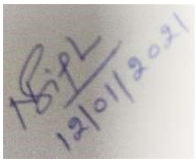
I declare that this written submission represents my ideas in my own words and where other's ideas or words have been included, I have adequately mentioned and referenced the original sources. I also declare that this project report has not been submitted elsewhere for a degree or diploma at this or any other higher education institute.



Date: January 12,2021

Signature of the student with date
(Shourya Singh)
101701023

Certified that the above statement made by the student is correct to the best of my knowledge and belief. I have checked all the requirements, formatting and other essential components of this report and it is as per the guidelines and standards.



Signature of the faculty Mentor with date
(**Dr. Neetu Singh**)
Associate Professor
Department of Chemical Engineering
Thapar Institute of Engineering and Technology