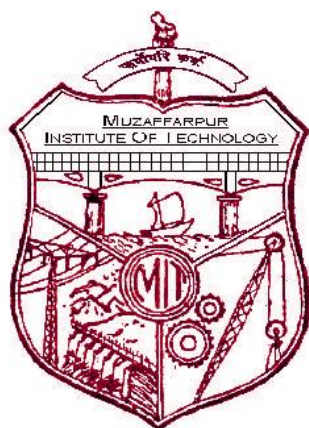# MIT MUZAFFARPUR

COURSE FILEOF

Chemical Engineering-1

(071404)

Faculty Name:

MITHILESH KUMAR RAI

ASSISTANT PROFESSOR,DEPARTMENT OF LEATHER TECHNOLOGY

Content

VISION STATEMENT

- To emerge as a national leader in graduate level studies in all sub areas of leather field and to make significant contribution to the development of the society, industry, nation and the world.

MISSION STATEMENT

- Educate leather technology students to produce quality engineers who serve leading firms and different sectors of the industry and can work in multi-disciplinary environment to anticipate and address evolving challenges of the 21st century in tanning and footwear industry.
- Impart high performance knowledge in leather and footwear sector that are economic and environment friendly.
- To establish national leadership and provide technological support to the Indian leather industry.
- Improve fundamental knowledge of inter relationship between the built environment and natural systems.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

After successful completion of program, graduates will be able to

PEO1: Work in the leather, chemical and footwear industries.

PEO2: Pursue higher studies.

PEO3: Contribute in teaching, research and other developmental activities of Leather technology and its allied fields.

PEO4: Work in the multicultural and multidisciplinary groups for the sustainable development and growth of leather industry projects and profession.

PROGRAMME OUTCOMES (PO)

Students who complete the B.E. degree in leather technology will be able to:

- An ability to apply knowledge of mathematics, science, and engineering,

- The ability to conduct laboratory experiments and to critically analyze and interpret experimental data.

- The ability to perform design of leather products by means of design experiences integrated throughout the professional component of the curriculum.

- An ability to function on teams, that must integrate contributions from different areas of leather technology towards the solution of multi-disciplinary projects.

- An ability to identify, formulate, and solve Leather technology problems.

- An understanding of professional practice issues in leather technology including professional and ethical responsibility.

- An ability to write and speak effectively.

- The broad education necessary to understand the impact of leather technology solutions in a global and societal context.

- A recognition of the need for, and an ability to engage in life-long learning,

- An ability to use the techniques, skills, and modern tools necessary for leather technology practices.

- Possess a thorough understanding of techniques that are appropriate to environment and country.

- Possess ability to estimate costs, estimate quantities and evaluate materials for leather manufacturing.

COURSE OBJECTIVE AND COURSE OUTCOMES:

Institute / College Name :	MUZAFFARPUR INSTITUTE OF TECHNOLOGY		
Program Name	**B. Tech.Leather Technology**		
COURSE CODE	071404		
COURSE NAME	**Chemical Engg-1**		
Lecture / Tutorial / Practical (per week):	3 – 0- 3	**Course Credits**	3
Course Coordinator Name	MITHILESH KUMAR RAI		

Course objective:

The objective of this course is to provide the fundamental concepts associated with the fluid mechanics and heat transfer operation.To introduce the basic concepts for the pressure measurement in pipes and other equipment. To give about heat transfer operation in different way like conduction convection and radiation. To give knowledge about heat exchanger and evaporators.   To give knowledge for application of different unit operation like Screening, Mixing and agitation in Leather industry.

Course outcomes (CO):

CO1: Became familiar with pressure measuring instrument and flow measurement instrument.

CO2: Learn the fluid dynamics and able to use these concept in leather industry.

CO3: Understand the mechanism of heat transfer operation in different materials. Became able to understand heat transfer operation in leather technology field.

CO4: Became able to know various types of mechanical operation like Screening, Mixing and agitation, floatation. Understand the application of these operations in leather industry.

MAPPING OF COs AND POs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓			✓							
CO2		✓	✓	✓								
CO3	✓			✓								
CO4	✓	✓			✓							

Correlation level: 1- slight (Low)   2- moderate (Medium)   3-substantial (High)

COURSE SYLLABUS:

Topics	Number of Lectures	Weightage (%)
Fluid Mechanics Properties of fluids, Compressible, Incompressible fluid, Viscosity, Elasticity, Vapour pressure, Surface tension, Buoyancy and floatation.	10	22
Flow Measurement Pitot tube, Venturi meter, Orifice meter, Pumps, Manometers	8	20
Fluid Dynamics Bernoulli's theorem, Continuity equation, Euler's equation, Energy and momentum equation, Basic concept of Newtonian and Non-Newtonian fluid.	8	20

Heat transfer Heat transfer by conduction, convection and radiation, Conduction through plain and cylindrical surfaces, Natural and forced convection, Heat transfer coefficient. Log mean temp. difference	9	22
Evaporation :- Types of Evaporators, Operation of Evaporation unit, Different methods of feedings	4	10
Size Separation Screening, Mixing and agitation, floatation	4	10

MUZAFFARPUR INSTITUTE OF TECHNOLOGY
B.Tech. 4th Semester (2016 Batch) PROVISIONAL TIME TABLE WITH EFFECT FROM 12.02.2018

	10:00 - 10:50	10:50 - 11:40	11:40 - 12:30	12:30 – 1:20	1:20 – 1:50	1:50- 2:40	2:40 - 3:30	3:30 – 4:20
				4thSEMESTER Leather technology	ROOM NO. LB-1			
MON			CH ENGG-1(MKR)		R			
TUES		CH ENGG-1(MKR) (lab)			E	CH ENGG-1(MKR)		
WED	CH ENGG-1(MKR)				C			
THUR					E			
FRI					S			
SAT					S			

FACULTY NAME:MKR: MITHILESH KUMAR RAI

STUDENT LIST:

Sl. No.	College Roll No.	AKU Reg. No.	Name
1	16LT08	16107107001	ARCHANA KUMARI
2	16LT20	16107107003	RAVINDRA RAM
3	16LT15	16107107004	SURBHI SAURAV
4	16LT11	16107107005	AMAN SHRIVASTAVA
5	16LT05	16107107007	VIKASH KUMAR
6	16LT19	16107107008	DEEPSHI
7	16LT16	16107107009	RAKESH KUMAR SAH
8	16LT14	16107107010	RAKESH KUMAR
9	16LT17	16107107011	KRITIKA VAGMI

Text Books:
TB1:. Fluid mechanics by R.K Rajput
TB2: Fluid mechanics by R.K Bansal
TB3:Heat transfer by B.K Dutta
TB4: Heat transfer operation by K.A Gavani
TB5: Unit operation of chemical Engineering by Mc cabe and Smith
Reference Books:
RB1: Heat transfer by J. P. Holman

RB2: Fluid Mechanics: Fundamentals and Applications by Yungus A. Cengel, John Cimbal

COURSE PLAN

Topic No.	Topic	No. of Lecture/ lecture no.	Text book
1.	**Fluid Mechanics**	**10**	**TB1,TB2**
	Properties of fluids	1-2	
	Incompressible fluid, Viscosity, Elasticity,	3-4	
	Vapour pressure, Surface tension	5-6	
	Buoyancy and floatation	7-10	
2.	**Flow Measurement**	**8**	**TB1,TB2**
	Pitot tube	11	
	Venturi meter	12	
	Orifice meter	13	
	Manometers	14-16	
	Pumps	17-18	
3.	**Fluid Dynamics**	**8**	**TB1,TB2**
	Continuity equation	19-20	
	Bernoulli's theorem	21-23	
	Euler's equation,	24	

	Energy and momentum equation	25	
	Basic concept of Newtonian and Non-Newtonian fluid	26	
4.	**Heat transfer**	**9**	**TB3,TB4**
	Heat transfer by conduction	27	
	Conduction through plain and cylindrical surfaces	28-29	
	convection	30	
	Heat transfer coefficient	31-32	
	Log mean temp. difference	33	
	Natural and forced convection	**34**	
	radiation	35	
5.	**Evaporation**	**4**	**TB5**
	Types of Evaporators	36-37	
	Operation of Evaporation unit, Different methods of feedings	38-39	
	Size Separation		
	Screening, Mixing and agitation	40-41	
	floatation	42-43	
Total Number of Lecture		43	

DETAILS OF ASSIGNMENTS:

S.No.	Assignment	Topic No.
1	Assignment 1	1,2
2	Assignment 2	3
3	Assignment 3	4
4	Assignment 4	5,6

Chemical Engineering -1 (071404)

Assignment -1

Q.1 Write down the properties of fluid? Draw the diagram of shear stress verses shear strain for all types of fluids.

Q.2 Describe the working principal of pitot tube with neat-sketch diagram.

Q.3 Write down the working principal of Centrifufual pump.

Q.4 Explain the different type of manometers for pressure measurement.

Chemical Engineering -1 (071404)

Assignment -2

Q.1 Explain the Newtonian and Non-Newtonian fluid.

Q.2 Explain the Eulers equation. Prove the formula for Bernoulli equation by using Eulers equation.

Q.3 Explain the continuity equation.

Chemical Engineering -1 (071404)

Assignment -3

Q.1 Write down the difference between Natural and forced convection.

Q.2 Explain heat transfer coefficient. Derive the formula for heat transfer coefficient .

Q.3 Derive the formula for Log mean temperature difference in heat exchangers.

Q.4 Derive the formula of heat transfer rate by Conduction through plain and cylindrical surfaces,

Chemical Engineering -1 (071404)

Assignment -4

Q.1 Write down the difference between forward feed and backward feed evaporators with diagram.

Q.2 Explain the capacity and economy of evaporators.

Q.3 Explain one screening instrument with diagram..

Subject: Chemical Engineering - I   Code: LT-071404

Max .mark:20   **Time** :2Hours

Note: Attempt any **four** question. All question have equal marks. Assume any missing data

Q1. What are Newotonian and non- Newtonian fluids. Show that shear stress verses velocity gradient profile for these fluids.

Q2. Explain the Euler's equation. Derive Bernoulli's equation for incompressible fluid.

Q3. Describe Venturi meter with proper diagram and flow equation for Venturi meter.

Q4. The space between two suare flat parallel plates is filled with oil. Each side of the plate is 720 mm. The thickness of the oil film is 15mm. The upper plate which moves at 3 m/s requires a force of 120 N to maintain the speed. Determine:

(a) The dynamic viscosity of the oil.

(b) The kinematic viscosity of oil if the specific gravity of oil is 0.95.

Q5. The diameter of a pipe at a section 1-1 and 2-2 are 100 mm and 200 mm respectively. If the velocity of water flowing through pipe at section 1-1 is 5m/s, then find-

(a) Discharge through the pipe

(b) Velocity of water section 2-2

Q6. Short note on following-

(a) Compressibility

(b) Continuity equation

(c) Define vapour pressure.

Question bank;

Code : 071404

B.Tech Leather Technology 4th Semester
Exam., 2015

CHEMICAL ENGINEERING

Time : 3 hours   Full Marks : 70

Instructions :

(i) **All** questions carry equal marks.

(ii) There are **NINE** questions in this paper.

(iii) Attempt **FIVE** questions in all.

(iv) Question No. **1** is compulsory.

1. Write short answers on any *seven* of the following :

   (a) What are compressible fluids?

   (b) Define Newton's law of viscosity.

   (c) Explain the concept of equilibrium vapor pressure.

   (d) Define continuity equation.

   (e) Explain elasticity.

   (f) Define thermal conductivity.

(2)

   (g) Define heat transfer coefficient.

   (h) What is Pitot tube?

   (i) What is Taylor's standard screen series?

   (j) Make line diagram of single-effect evaporator showing all its input and output streams.

2. What are Newtonian and non-Newtonian fluids? Show that shear stress versus velocity gradient profile for these fluids. Define viscosity for the Newtonian fluids. What is kinematic viscosity?

3. What is Euler's equation? Derive Bernoulli's equation without friction for unidirectional flow of fluids of constant density and zero viscosity using Euler's equation.

4. In the measurement of flow for fluids, compare venturi meter with orifice meter in terms of advantages and disadvantages. Make a neat classification of different category of pumps.

5. Derive the flux equation of conduction through plain composite slab with all necessary assumptions.

6. Draw temperature-length curve for parallel as well as countercurrent flow in a double-pipe heat exchanger. What is LMTD and why is it used in a heat exchanger? With necessary assumptions, derive the expression for LMTD.

7. Draw neat line diagram of triple effect evaporator system in forward feed arrangement. Compare various feeding arrangements for a multiple effect evaporator system.

8. Differentiate between differential and cumulative screen analysis. Write short notes on mixing and analysis.

Result of the students

Roll No	Name	Marks of attendance	Class test	End semester exam	Total	Marks of attendance	Class performance	viva voice	Total
16LT08	ARCHANA KUMARI	5	5	18	28	5	5	8	18
16LT20	RAVINDRA RAM	4	5	14	23	4	4	8	16
16LT15	SURBHI SAURAV	5	5	17	27	5	5	8	18
16LT11	AMAN SHRIVASTAVA	5	5	18	28	5	5	8	18
16LT05	VIKASH KUMAR	5	5	16	26	5	5	8	18
16LT19	DEEPSHI	5	5	18	28	5	5	9	19
16LT16	RAKESH KUMAR SAH	5	5	17	27	5	5	8	18
16LT14	RAKESH KUMAR	5	5	8	18	5	5	7	17
16LT17	KRITIKA VAGMI	5	5	19	29	5	5	9	19

RESULT ANALYSIS

Tota student (9) Theory
- 27-30
- 24-26
- 20-23
- 0-19

Weak, average, Good, Excellent
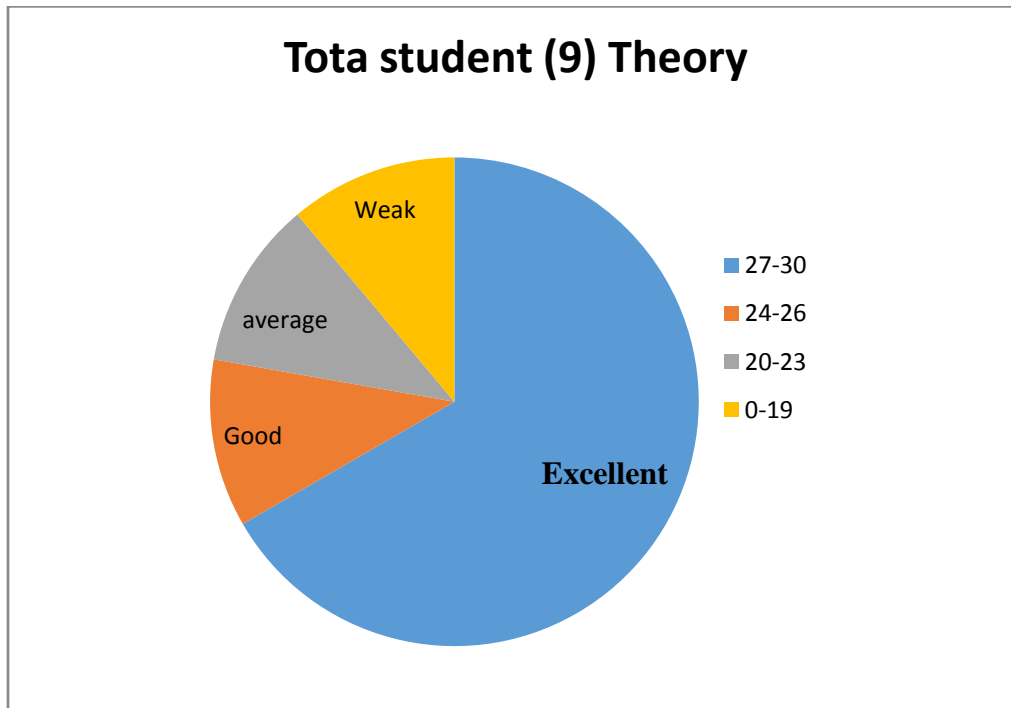
Number of student (9) (Theory)	Marks obtained (30)	Performance
6	27-30	Excellent
1	24-26	Good
1	20-23	Average
1	0-19	Weak

Total student (9) (Practical)
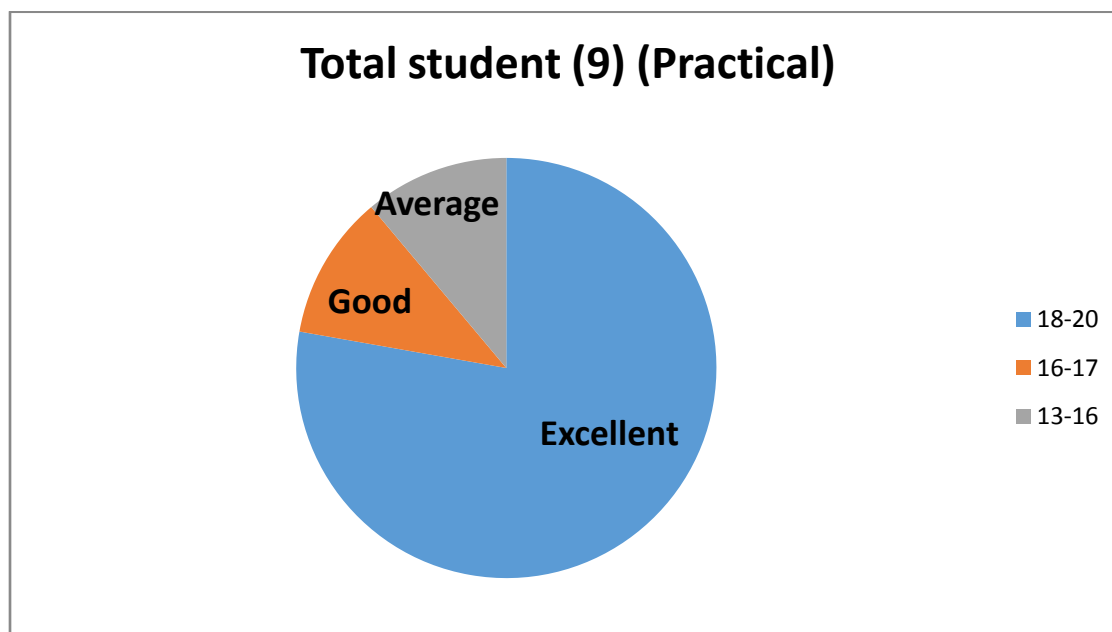
Number of student (9) (Theory)	Marks obtained (20)	Performance
7	18-20	Excellent
1	16-17	Good
1	13-16	Average