B.Tech. Chemical Structure Pattern D20 (applicable w.e.f. AY 21-22)

Final Year Module -VII

Subject head	Course code	Course name	Contact hours per week			Credits
			Theory	Lab	Tut	
S1	CH4201	PROJECT MANAGEMENT	2	-		2
S1	MD4201	ENGINEERING AND MANAGERIAL ECONOMICS	2	-		
S2	CH4253	BIOPROCESS ENGINEERING	2			2
S3	CH4255	NANOSCIENCE AND NANOTECHNOLOGY	2	-	-	2
S4	CH4289	MAJOR PROJECT	-	20	-	10
OR						
S1	CH4293	INDUSTRY INTERNSHIP	-	-	-	16
	CH4291	RESEARCH INTERNSHIP				
	CH4294	INTERNATIONAL INTERNSHIP				
	CH4295	CAPSTONE PROJECT				
Total						16

Final Year Module -VIII

Subject head	Course code	Course name	Contact hours per week			Credits
			Theory	Lab	Tut	
S1	CH4208	PETROLEUM ENGINEERING	2	-		2
S2	CH4204	INDUSTRIAL POLLUTION CONTROL	2			2
S3	CH4210	FOOD TECHNOLOGY	2			2
S4	CH4288	MAJOR PROJECT 2	-	20	-	10
OR						
S1	CH4293	INDUSTRY INTERNSHIP	-	-	-	16
	CH4291	RESEARCH INTERNSHIP				
	CH4294	INTERNATIONAL INTERNSHIP				
	CH4295	CAPSTONE PROJECT				
Total						16

FF No. : 654

CH4201::PROJECT MANAGEMENT

Course Prerequisites:

Course Objectives:

1.

2.

3.

4.

5.

Credits:..... **Teaching Scheme Theory: ……..** Hours/Week

Tut: …….. Hours/Week

Lab: **……..** Hours/Week

Course Relevance:.....

SECTION-1
Topics and Contents *Introduction: Definition & Characteristics of Project, Performance Parameters: Time, Cost & Quality. Difference with respect to Standard Routine Production. Classification of Projects: Sector based, Investment based, Technology based, Causation based, Need based (BMERD) - Balancing, Modernization, Replacement, Expansion & Diversification Project Life Cycle Phases – Concept/Initiation Phase: Parameters Involved in Project Identification. Sources of New Project Ideas. Governmental Framework for Identification of Opportunities, Incentives from state & central govt.; Import-substitution projects* *Project Conceptualization & Feasibility Analysis Project Definition Phase: Project Formulation & Feasibility. Types of Feasibility Studies – Pre-feasibility, Support/Functional, Feasibility Study. Preparation of Project Feasibility Report & Specification; Aspects of Project Feasibility Managerial/Organization: Promoters Background, Criteria of Evaluation, Marketing/Commercial: Demand & Supply, Competition, Market Survey, Porter's 5 Forces, Operational/Technical: Process, Technology, Location, Capacity, Labour, Raw Material & Utility Availability. Financial: Cost of Project, Means of Finance, Financial Projections – Profit & Loss Account, Balance Sheet, Funds Flow Statement, Cash Flow Statement, Schedule*

of Fixed Assets, Schedule of Term Loans. Socio-Economic: Socio-Cost Benefit Analysis. Effective Rate of Protection, Domestic Resource Cost

SECTION-1I

Topics and Contents

Project Planning, Implementation & Control Planning & Organization Phase: Project Planning, Scheduling & Monitoring, Statement of Works, Project Specifications, Work Breakdown Structure, Network Analysis & Duration Estimating Network Diagrams – PERT/CPM, Estimate Activity Times, Milestone Scheduling. Project Organization & Management. Project Organization Structure, Role of Project Manager.

List of Tutorials: (Any Three)

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10)

List of Practicals: (Any Six)

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List of Projects:

1.
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List of Course Seminar Topics:

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

List of Course Group Discussion Topics:

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

List of Home Assignments:

Design:

1.
2.
3.
4.
5.

Case Study:

1.
2.
3.
4.
5.

Blog

1.
2.
3.
4.
5.

Surveys

1.
2.
3.
4.
5.

Suggest an assessment Scheme:
Suggest an Assessment scheme that is best suited for the course. Ensure 360 degree assessment and check if it covers all aspects of Blooms Taxonomy.

Text Books: ***(As per IEEE format)***

1. Narendra Singh; Project Management & Control; Himalaya Publishing House, Mumbai 2. S. Choudary, Project Management, Tata McGraw Hill

Reference Books: ***(As per IEEE format)***

1. Maylor, Project Management, Pearson Education,
2. Gopal & Ramamurthy; Project Management Handbook; Macmilan.
3. Project Management Body of Knowledge

Moocs Links and additional reading material: www.nptelvideos.in

Course Outcomes:
Students will be able to:
1. Learn the basic concepts of project and project management
2. Ascertain the feasibility of small and medium projects with respect to managerial, marketing, operational, financial and socio-economic perspectives

3. Plan and schedule small and medium projects to achieve the triple constraint of time, cost 4. Understand the concepts of project risk 5. Monitor the progress of projects to determine variances and recommend corrective actions
CO PO Map
CO attainment levels
Future Courses Mapping: *Mention other courses that can be taken after completion of this course*
Job Mapping: *What are the Job opportunities that one can get after learning this course*

FF No. : 654

MD4201::ENGINEERING AND MANAGERIAL ECONOMICS

Course Prerequisites:

Course Objectives:

1.
2.
3.
4.
5.

Credits:..... **Teaching Scheme Theory: ……..** Hours/Week

Tut: …….. Hours/Week

Lab: **……..** Hours/Week

Course Relevance:.....

SECTION-1
Topics and Contents
SECTION-1I

Topics and Contents

List of Tutorials: (Any Three)

1)
2)
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10)

List of Practicals: (Any Six)

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List of Projects:

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10.

List of Course Seminar Topics:

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

List of Course Group Discussion Topics:

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

List of Home Assignments:
Design:
1.
2.
3.
4.
5.
Case Study:
1.
2.
3.
4.
5.
Blog
1.
2.
3.
4.
5.
Surveys
1.
2.
3.
4.
5.

Suggest an assessment Scheme:
Suggest an Assessment scheme that is best suited for the course. Ensure 360 degree assessment and check if it covers all aspects of Blooms Taxonomy.

Text Books: ***(As per IEEE format)***

1. Narendra Singh; Project Management & Control; Himalaya Publishing House, Mumbai 2. S. Choudary, Project Management, Tata McGraw Hill

Reference Books: ***(As per IEEE format)***

1. Maylor, Project Management, Pearson Education,
2. Gopal & Ramamurthy; Project Management Handbook; Macmilan.
3. Project Management Body of Knowledge

Moocs Links and additional reading material: www.nptelvideos.in

Course Outcomes:

Students will be able to:

1. Learn the basic concepts of project and project management
2. Ascertain the feasibility of small and medium projects with respect to managerial, marketing, operational, financial and socio-economic perspectives
3. Plan and schedule small and medium projects to achieve the triple constraint of time, cost
4. Understand the concepts of project risk
5. Monitor the progress of projects to determine variances and recommend corrective actions

CO PO Map

CO attainment levels

Future Courses Mapping:

Mention other courses that can be taken after completion of this course

Job Mapping: *What are the Job opportunities that one can get after learning this course*

FF No. : 654

CH4253:: BIOPROCESS ENGINEERING

Course Prerequisites:

Course Objectives:

The student will be able to

1. To understand cell structure and biochemicals.

2.To understand enzymes and enzyme kinetics.

3.To understand different types of bioreactors and scale up bioreactors.

4.To understand commercially used different bioprocesses.

Credits:2..... **Teaching Scheme Theory: …2...** Hours/Week

Tut: …0... Hours/Week

Lab: **0…...** Hours/Week

Course Relevance:. The study of the subject will help to understand basic concepts of biochemicals, enzymes and enzyme kinetics required in the design of bioprocesses and different types of bioreactors used in bioprocesses. This subject also gives an overview of scale up of bioreactors and commercially used different bioprocesses.

SECTION-1

Topics and Contents

Introduction to structure of cells, important cell types, growth of microbial cells. Bio-chemicals: Primary, secondary, tertiary structure of biomacromolecules such as lipids, sugars and polysaccharides, nucleotides, RNA, DNA, amino acids, proteins, hybrid biochemicals etc. Enzyme substrate complex and enzyme action with examples from industrial enzymes, simple enzymes, kinetics with one and two substrates. Michaelis-Menten kinetics. Models of enzymes kinetics with brief introduction

SECTION-1I

Topics and Contents

Major components in bioreactor, Types of bioreactors, modern bioreactors types, scale up and its difficulties, considerations on aeration, agitation, and heat transfer, Discuss manufacturing process for major products produced by biochemical reactions such as alcohol, acetic acid and vinegar, acetone, lactic acid, citric acid, wine.

List of Home Assignments:

Design:

1.Bioreactor design.
2. Michaelis-Menten kinetics
3. Enzyme kinetics with one substrate
4. Enzyme kinetics with two substrate
5. Monod growth kinetics

Case Study:

1. Scale up of bioreactor.
2. Lactic acid manufacturing.
3. Acetic acid manufacturing.
4. Ethanol manufacturing.
5. Single cell proteins.

Blog

1. Different types of bioreactors.
2. Enzyme substrate complex.
3. Different types of enzymes.
4. Different types of proteins.
5. DNA

Surveys

1. Applications of bioprocesses in the food sector.
2. Applications of bioprocesses in the healthcare sector.
3. Applications of bioprocesses in the industrial chemicals sector.
4. Applications of bioprocesses in the dairy sector.
5. Applications of bioprocesses in the agricultural sector.

Suggest an assessment Scheme:

Suggest an Assessment scheme that is best suited for the course. Ensure 360 degree assessment and check if it covers all aspects of Blooms Taxonomy.

MSE	*ESE*	*HA*	*VIVA*
30	*30*	*20*	*20*

MSE - Mid Semester Examination

ESE - End Semester Examination

HA - Home Assignment

VIVA - Viva voice

Text Books: ***(As per IEEE format)***

1.Bailey, James E Ollis, Davis F, "Biochemical Engineering", McGraw Hill.

2.Shuler M. L. and F. Kaegi, 'Bioprocess Engineering – Basic Concepts', Prentice Hall Publication ,2nd Edition

Reference Books: ***(As per IEEE format)***

1. Aiba A-Humphery A.E., Mills N.F , "Biochemical Engineering",., Academic Press.
2. Atkinson B, "Biochemical Reactors", Pion Ltd. London.
3. Ghosh T.K., et. Al., "Advances in Biochemical Engineering", Vol.1/3, Springer Verlag 1971-74
4. Wingard L.B., "Enzyme Engineering", Fr. Interscience N.Y. 1972.
5. Peavy H. S., Rowe D. R., Tchobanoglous G., "Environmental Engineering", McGraw-Hill, 1985.
6. P. F. Stanbury, A. Whitekar, S. J. Hall, 'Principles of Fermentation Technology', Butterworth-Heinemann An Imprint of Elsevier, 2nd Edition.

Moocs Links and additional reading material: www.nptelvideos.in

Course Outcomes:
The student will be able to

1) describe different types of biochemicals.
2) derive the kinetics & describe mechanism of bio-cataysis.
3) describe various components & types of bioreactors.
4) describe various bioprocesses in chemical industry

CO PO Map

CO/PO	PO: 1	PO: 2	PO: 3	PO: 4	PO: 5	PO: 6	PO: 7	PO : 8	PO: 9	PO:10	PO: 11	PO:12	PSO: 13	PSO: 14
CO:1														
CO:2														
CO:3														
CO: 4														
CO: 5														
CO: 6														

CO attainment levels

CO	Attainment level
CO : 1	**3**
CO : 2	**4**
CO : 3	**5**
CO : 4	**5**

Future Courses Mapping:
Biotechnology

Job Mapping:
Pharmaceutical industries, Water and wastewater treatment plants, Food industries, Medicine sector, Industrial chemical manufacturing, etc

FF No. : 654

CH4255::NANOSCIENCE AND NANOTECHNOLOGY

Course Prerequisites:

Course Objectives:

The student will be able to

1.

2.

3.

4.

Credits:2..... **Teaching Scheme Theory: …2...** Hours/Week

Tut: …0... Hours/Week

Lab: **0…...** Hours/Week

Course Relevance:.

SECTION-1
Topics and Contents

SECTION-1I

Topics and Contents

List of Home Assignments:

Design:

1.
2.
3.
4.
5.

Case Study:

1.
2.
3.
4.
5.

Blog

1.
2.
3.
4.
5.

Surveys

1.
2.
3.
4.
5.

Suggest an assessment Scheme:
Suggest an Assessment scheme that is best suited for the course. Ensure 360 degree assessment and check if it covers all aspects of Blooms Taxonomy.

MSE	*ESE*	*HA*	*VIVA*
30	*30*	*20*	*20*

MSE - Mid Semester Examination

ESE - End Semester Examination

HA - Home Assignment

VIVA - Viva voice

Text Books: ***(As per IEEE format)***

1.
2.

Reference Books: *(As per IEEE format)*

1.
2

Moocs Links and additional reading material: www.nptelvideos.in

Course Outcomes:
The student will be able to
1)
2)
3)
4)
5)
6)

CO PO Map

CO/PO	PO:1	PO:2	PO:3	PO:4	PO:5	PO:6	PO:7	PO:8	PO:9	PO:10	PO:11	PO:12	PSO:13	PSO:14
CO:1														
CO:2														
CO:3														
CO: 4														
CO: 5														

CO: 6														

CO attainment levels

CO	**Attainment level**
CO : 1	
CO : 2	
CO : 3	
CO : 4	
CO : 5	
CO : 6	

Future Courses Mapping:

Project Management

Job Mapping:
All core chemical industries e.g. Oil and gas, paint, fertilizers, food, industrial chemicals manufacturing, etc

FF No. : 654

CH4289::MAJOR PROJECT

Course Prerequisites: Basic principles of physics, mathematics, chemistry, heat transfer

Course Objectives:

The Students will be able to

1. Do literature search appropriately with available tools
2. Defining of project title/idea
3. Allocation of tasks among the team members
4. Team spirit development
5. Write a report, research paper with required format
6. Present work effectively with concrete results

Credits: 10

Teaching Scheme Theory: ….. Hours/Week

Tut: ……... Hours/Week

Lab: **20** Hours/Week

Course Relevance:.....

SECTION-1&II

Topics and Contents

This stage will include a complete report consisting of synopsis, the summary of the literature survey carried out, Details of experimental/theoretical work and results and discussion and conclusion.

Students may undertake studies in application chemical engineering knowledge for manufacturing project, synthesis, design and development, experimental work, testing on the product or system, generation of new ideas and concept, modification in the existing process/system, development of computer programs, solutions, modeling and simulation related to the subject. Topics of interdisciplinary nature may also be taken up. A detailed literature survey is expected to be carried out as a part of this work. The group of students is required to choose the topic in consultation with the Guide.

A technical report of 15 pages is required to be submitted at the end of the term and a presentation made based on the same. Modern audio-visual techniques may be used at the time of presentation.
The external from Industry/research organization is invited to evaluate the projects done by students.

List of Project areas:

1. Agriculture
2.Personal Health
3. Social health
4. Hygiene
5. Energy
6. Environment
7.Potable Water
1. Solar based
2. Modeling and Simulation
10. Waste water treatment
11. Air pollution
12. Solid waster management
13. Low cost product development

Suggest an assessment Scheme:
Assessment of project includes three reviews spread across 4 months, where research innovative ideas, strategy of execution, actual execution, teamwork is assessed.

Every review is based on report writing, presentation of results and team work demonstration.

Two reviews are with internal faculty members
Third review is with an external industry expert.

Review 1: Literature search and deciding appropriate topic
Review 2: Progress of work on decided topic i.e setting experimental setup, developing methodology of solving the opted problem.
Review 3: Overall assessment of project work with team efforts.

Moocs Links and additional reading material: www.nptelvideos.in

1. https://nptel.ac.in/courses/103/103/103103039/#watch
2. https://www.honeywellprocess.com/en-US/explore/solutions/integrated-technology/Pages/leap.aspx
3. https://www.gtu.ac.in/uploads/GIC%20Compendium%20IDP-UDP.pdf
4. https://www.udemy.com/course/leadership-psychology-cultivate-creativity-and-innovation/
5. https://www.coursera.org/learn/uva-darden-project-management
6. https://www.coursera.org/specializations/innovation-creativity-entrepreneurship

Course Outcomes: The student will be able to –

1. Apply chemical engineering knowledge.
2. Learn how to work in a team.
3. Define a task (problem) and execute it.
4. Carry out research and development work.
5. Design equipments or process for chemical engineering plants.
6. Document findings or design in selected topic

CO PO Map

CO/ PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1	3	1	1	1	0	1	1	1	1	1	1	1	1	1
CO2	0	0	0	0	0	0	0	2	3	1	3	1	0	0
CO3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
CO4	1	3	1	1	1	1	1	1	1	1	1	1	1	1
CO5	1	1	1	1	1	1	1	1	1	3	1	1	1	1
CO6	1	1	1	1	1	1	1	1	1	2	1	1	1	1

CO attainment levels

CO	Attainment level
1	2
2	3
3	3
4	5
5	5
6	4

Future Courses Mapping:

Semester long inturnship

Job Mapping:
What are the Job opportunities that one can get after learning this course
Core Chemical Engineering industrial job
Chemical Engineering Design job
Chemical Engg. research jobs

CH4208::PETROLEUM ENGINEERING

Course Prerequisites: Basics of Chemical technology, Chemistry

Course Objectives:

1. Comprehend properties of petroleum products.
2. Understand pre-refining operation based on feed composition.
3. Comprehend cracking and reforming processes.
4. Understand coking and additive production processes.
5. Comprehend product refining operation and effect of additives.
6. Understand safety aspect during handling petroleum product.

Credits: 04

Teaching Scheme Theory: 02.. Hours/Week

Tut: .... Hours/Week

Lab: ... Hours/Week

Course Relevance:

Petroleum is major portion of chemical engineering industry. Knowing different properties of petroleum is of crucial for processing and selecting proper process to get maximum output in term of quality and quantity of product. This course will enable to understand petroleum feed, product qualities, different process to process crude for product, different additives for getting better product with understanding safety aspect involved during process.

SECTION-1

Topics and Contents

Petroleum composition, specifications of petroleum and some petroleum products such as LPG, Gasoline, Kerosene, Diesel oil and Engine oil.

Pre- refining operations: Settling, Moisture removal, Storage, Heating through exchangers and pipe seal heaters, Atmospheric distillation, Vacuum distillation

Significant conversion units such as, Reforming, Catalytic-Cracking, Hydro-cracking.

SECTION-1I

Topics and Contents

Coking and Thermal Processes: Delayed coking, Flexi coking, Fluid coking.

Additives Production such as Ether and Isobutylene production

Refining of petroleum products such as Acid refining, Chemical refining, Hydro-refining, HDS, HDM, HAD.

Blending, Additives, Storage of products, Transportation, Housekeeping, Marketing of petroleum and petroleum products, Safety norms for petroleum products.

List of Tutorials: (Any Three)

1) Specification of petroleum

2) Specification of Gasoline, diesel, kerosene, engine oil etc.

3) Pre refining processes

4) atmospheric distillation

5) vacuum distillation

6) Coking

7) Thermal process for cracking

8) refining petroleum product

9) Additives in Petroleum products

10) Safety norms for handling petroleum product

List of Practicals: (Any Six)

1) Study of world oil reservoirs.

2. Study of Indian oil reservoirs.

3. Study of Indian oil refineries.

4. Study of pre-refinery crude oil operations.

5. Study of properties of petroleum products.

6. Study of different additives and blending chemicals.

7. Study of post refinery crude oil operations.

8. Study of recent trends in petrochemicals in terms of packaging materials.

9. Study of recent trends in petrochemicals in terms of catalyst.

10. Study of recent trends in petrochemicals in terms of distillation.

11. Study of recent trends in marketing of petroleum products.

12. Study of safety norms of petroleum product.

List of Projects:

1. A project on design of fire heaters
2. A project on design of multistage atmospheric distillation column
3. A project on design of vacuum distillation column
4. A project on properties of gasoline.
5. A project on properties of diesel.
6. A project on properties of kerosene.
7. A project on properties of lubricating oil.
8. A project on overview of refinery processes.
9. A project on design of pipe still heater.
10. A project on gas to liquid technology.
11. A project on purification of natural gas.
12. A project on liquefaction of natural gas.

List of Course Seminar Topics:

1. Origin and composition of crude oil
2. Reserves and deposit of crude oil
3. Thermal properties and test methods for natural gas
4. Thermal properties and test methods for gasoline
5. Thermal properties and test methods for diesel
6. Thermal properties and test methods for lube oil/engine oil
7. Pretreatment of crude oil
8. Heating of crude- Pipe still heater
9. Distillation of crude oil
10. Blending and additives of gasoline
11. Catalytic cracking of crude oil
12. Hydro cracking of crude oil
13. Reforming
14. Marketing of petroleum and petroleum products
15. Storage of petroleum and petroleum products
16. Transportation of petroleum and petroleum products

List of Course Group Discussion Topics:

1. Properties of gasoline and its effect on engine performance
2. Properties of diesel and its effect on engine performance
3. Need and pretreatment of crude oil
4. Atmospheric distillation Vs Vacuum distillation
5. Catalytic cracking Vs hydro cracking
6. Hydro treating and its importance in petroleum refinery
7. Fall in Crude Oil Prices and its Implications
8. Different modes of transportation of petroleum products and Safety norms
9. Different modes of storage of petroleum products and Safety norms
10. Sulfuric acid alkylation Vs hydrofluoric acid alkylation
11. Isomerization process and its importance in petroleum refinery
12. Wax in crude and its purification
13. Gasoline treatment and its need

List of Home Assignments:

Design:

1. Design of pipe still heater
2. Design of multistage atmospheric distillation column
3. Design of solvent extraction process
4. Design of H2S absorption column
5. Design of multicomponent distillation column in refinery

Case Study:

1. Oil industry safety and fire incidents
2. India's dependency on crude oil and analysis of alternative sources
3. Refineries and modernization
4. Evolution of FCC unit configuration
5. Petroleum feed condition effect on product

Blog

1. Where Would We Be Without...Petroleum Products?
2. How Much Oil is Left in the World?
3. OPEC: 15 key insights
4. Snapshot of Gasoline market dynamics: 2019
5. Uniqueness of multicomponent distillation column for petroleum refining.

Surveys

1. Reserve and deposits of world

2. Petro Glimpses and Petroleum industries in India

3. World energy requirement and fissile fuel

4. How long crude oil will last?

5. fossil verses other energy resources

Suggest an assessment Scheme:

Text Books: ***(As per IEEE format)***

1. Gary James, Handwerk, Glenn, Kaiser, Mark; Petroleum Refining: Technology and Economics; 5th Edition, Taylor and Francis - CRC Press, 2005.

2. Nelson W. L.; Petroleum refinery Engineering; 3rd Edition, John Wiley and Sons New York, 1985.

Reference Books: ***(As per IEEE format)***

1. Meyers R. A.; Handbook of Petroleum refining processes, 3rd Edition, H Prentice-Hall, 2003.

2. Speight J. G.; Chemistry and Technology of Petroleum; 4th Edition, Taylor and Francis –

CRC Press, 1999.

Moocs Links and additional reading material: www.nptelvideos.in

Coursera course : https://www.coursera.org/learn/oilandgas?utm_source=gg&utm_medium=sem&utm_content=94-BrandedSearch-IN&campaignid=1776545273&adgroupid=71792235071&device=c&keyword=courseera&matchtype=b&network=s&devicemodel=&adpostion=&creativeid=442149625903&hide_mobile_promo=&gclid=CjwKCAjw26H3BRB2EiwAy32zhWC7Rb6-M2q5nCMXB1k_aU0T1hlGthE1haYkrqYJt0W8hO3UNdBeghoCeS8QAvD_BwE

Udemy coourse: https://www.udemy.com/courses/search/?src=ukw&q=petroleum

Course Outcomes:

The student will be able to –

1. Find out composition, main characteristics and new trends of petroleum products

2. Select pre-refining operation depending on feed composition

3. Describe cracking and reforming processes

4. Describe coking and additive production processes

5. Select product refining operations and additives to increase quality of petroleum products

6. Develop knowledge of safety during storage, transportation and marketing of petroleum product

CO PO Map

CO attainment levels

Future Courses Mapping:

Advances in Petroleum field

Job Mapping:

Petroleum refinery jobs

Designing companies for petroleum refinery

FF No. : 654

CH4204::INDUSTRIAL POLLUTION CONTROL

Course Prerequisites:

Course Objectives:

1.

2.

3.

4.

5.

Credits:..... **Teaching Scheme Theory: ……...** Hours/Week

Tut: ……... Hours/Week

Lab: **……...** Hours/Week

Course Relevance:.....

SECTION-1
Pollution and its measurement*: Types of pollutions, pollution control aspects, industrial emissions of liquids and gaseous pollutants, environmental legislations, Industrial waste water analysis, industrial gaseous effluent analysis, particle size distribution* ***Removal of organic matter:*** *Biological oxidation, bacterial population dynamics, kinetics of biological growth and its applications to biological treatment, biological oxidation units, anaerobic treatment* ***Removal of chromium****: Control methods, reduction precipitation, lime coagulation, adsorption* ***Removal of mercury****: Removal of mercury from gaseous streams, removal of mercury from liquid streams* ***Removal of particulate matter****: particulate dynamics, separation of particulate matter from effluent gases, preliminary methods of separation*

Removal of phenolic effluents*: sources of phenol, treatment, removal*

SECTION-1I

Removal of sulphur dioxide*: effects of sulphur dioxide, control methods, reduction of sulphur dioxide concentration, wet process.*

Removal of oxides of nitrogen*: analysis of NOx, control measures.*

Waste water treatment processes: *Design concepts for primary treatment, grid chambers and primary sedimentation basins, biological treatment, Bacterial population dynamics, kinetics of biological growth and its applications to biological treatment, process design relationships and analysis, determination of kinetic coefficients, activated sludge process.*

Pollution Control in Process Industries : *Study of environment pollution from process industries and their abatement. Fertilizer, paper and pulp, petroleum and petrochemicals, tanning industries, sugar industries etc*

List of Tutorials: (Any Three)

1)
2)
3)
4)
5)
6)
7)
8)
9)
10)

List of Practicals: (Any Six)

1. Determination of acidity of various water samples.
2. Determination of the alkalinity of various water samples.
3. Determination of the chloride content in the given water samples.
4. Determination of the optimum coagulant dose for the removal of maximum turbidity
5. Determination of the hardness of the given water sample
6. Determination of the iron content of water samples
7. Determination of Dissolved oxygen of water
8. Determination of Biochemical oxygen demand (B.O.D.) of given Water / wastewater samples (BOD_5)
9. Determination of Chemical oxygen demand (COD) of a given sample.
10. Determination of sulphate content of the given water sample

List of Projects:

1. Solid waste management
2. Water pollution control
3. Gaseous Pollution
4. Particulate pollution

List of Course Seminar Topics:

1. Pollution control in Dairy industry
2. Pollution control in Pharma Industry
3. Pollution control in Sugar Industry
4. Pollution control in petroleum industry

List of Course Group Discussion Topics:

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

List of Home Assignments:

Design:

1.
2.
3.
4.
5.

Case Study:

1.
2.
3.
4.
5.

Blog

1. Vehicular pollution

Surveys

1.
2.
3.
4.
5.

Suggest an assessment Scheme:

Suggest an Assessment scheme that is best suited for the course. Ensure 360 degree assessment and check if it covers all aspects of Blooms Taxonomy.

Text Books: ***(As per IEEE format)***

1. *Name(s) of author(s); Title of the book; Edition No., Publisher*
2
3
4

Reference Books: ***(As per IEEE format)***

1. *Name(s) of author(s); Title of the book; Edition No., Publisher*
2
3
4

Moocs Links and additional reading material: www.nptelvideos.in

Course Outcomes:
1)
2)
3)
4)
5)
6)

CO PO Map

CO attainment levels

Future Courses Mapping:

Mention other courses that can be taken after completion of this course

Job Mapping:
What are the Job opportunities that one can get after learning this course

FF No. : 654

CH4210:: FOOD TECHNOLOGY

Course Prerequisites:

Course Objectives:

The student will be able to

1.

2.

3.

4.

Credits:2..... **Teaching Scheme Theory: …2...** Hours/Week

Tut: …0... Hours/Week

Lab: **0…...** Hours/Week

Course Relevance:.

SECTION-1
Topics and Contents
SECTION-1I
Topics and Contents

List of Home Assignments:
Design:
1.
2.
3.
4.
5.
Case Study:
1.
2.
3.
4.
5.
Blog
1.
2.
3.
4.
5.
Surveys
1.
2.
3.
4.
5.

Suggest an assessment Scheme:
Suggest an Assessment scheme that is best suited for the course. Ensure 360 degree assessment and check if it covers all aspects of Blooms Taxonomy.

MSE	*ESE*	*HA*	*VIVA*
30	*30*	*20*	*20*

MSE - Mid Semester Examination

ESE - End Semester Examination

HA - Home Assignment

VIVA - Viva voice
Text Books: ***(As per IEEE format)***
1. 2.
Reference Books: ***(As per IEEE format)***
1. 2
Moocs Links and additional reading material: www.nptelvideos.in
Course Outcomes: **The student will be able to** 1) 2) 3)

4)
5)
6)

CO PO Map

CO/PO	PO: 1	PO: 2	PO: 3	PO: 4	PO: 5	PO: 6	PO: 7	PO : 8	PO: 9	PO:10	PO: 11	PO:12	PSO: 13	PSO: 14
CO:1														
CO:2														
CO:3														
CO: 4														
CO: 5														
CO: 6														

CO attainment levels

CO	Attainment level
CO : 1	
CO : 2	
CO : 3	
CO : 4	
CO : 5	

CO : 6	

Future Courses Mapping:

Project Management

Job Mapping:
All core chemical industries e.g. Oil and gas, paint, fertilizers, food, industrial chemicals manufacturing, etc

FF No. : 654

CH4288::MAJOR PROJECT 2

Course Prerequisites: Basic principles of physics, mathematics, chemistry, heat transfer

Course Objectives:

The Students will be able to

7. Do literature search appropriately with available tools
8. Defining of project title/idea
9. Allocation of tasks among the team members
10. Team spirit development
11. Write a report, research paper with required format
12. Present work effectively with concrete results

Credits: 10 **Teaching Scheme Theory: …..** Hours/Week

Tut: ……... Hours/Week

Lab: **20** Hours/Week

Course Relevance:.....

SECTION-1&II
Topics and Contents *This stage will include a complete report consisting of synopsis, the summary of the literature survey carried out, Details of experimental/theoretical work and results and discussion and conclusion.* *Students may undertake studies in application chemical engineering knowledge for manufacturing project, synthesis, design and development, experimental work, testing on the product or system, generation of new ideas and concept, modification in the existing process/system, development of computer programs, solutions, modeling and simulation related to the subject. Topics of interdisciplinary nature may also be taken up. A detailed literature survey is expected to be carried out as a part of this work. The group of students is required to choose the topic in consultation with the Guide.* *A technical report of 15 pages is required to be submitted at the end of the term and a presentation made based on the same. Modern audio-visual techniques may be used at the time of presentation.* *The external from Industry/research organization is invited to evaluate the projects done by students.*

List of Project areas:

1. Agriculture
2.Personal Health
3. Social health
4. Hygiene
5. Energy
6. Environment
7.Potable Water
3. Solar based
4. Modeling and Simulation
10. Waste water treatment
11. Air pollution
12. Solid waster management
13. Low cost product development

Suggest an assessment Scheme:

Assessment of project includes three reviews spread across 4 months, where research innovative ideas, strategy of execution, actual execution, teamwork is assessed.

Every review is based on report writing, presentation of results and team work demonstration.

Two reviews are with internal faculty members
Third review is with an external industry expert.

Review 1: Literature search and deciding appropriate topic
Review 2: Progress of work on decided topic i.e setting experimental setup, developing methodology of solving the opted problem.
Review 3: Overall assessment of project work with team efforts.

Moocs Links and additional reading material: www.nptelvideos.in

7. https://nptel.ac.in/courses/103/103/103103039/#watch
8. https://www.honeywellprocess.com/en-US/explore/solutions/integrated-technology/Pages/leap.aspx
9. https://www.gtu.ac.in/uploads/GIC%20Compendium%20IDP-UDP.pdf
10. https://www.udemy.com/course/leadership-psychology-cultivate-creativity-and-innovation/
11. https://www.coursera.org/learn/uva-darden-project-management
12. https://www.coursera.org/specializations/innovation-creativity-entrepreneurship

Course Outcomes: The student will be able to –

1. Apply chemical engineering knowledge.
2. Learn how to work in a team.
3. Define a task (problem) and execute it.
4. Carry out research and development work.
5. Design equipments or process for chemical engineering plants.
6. Document findings or design in selected topic

CO PO Map

CO/ PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO1	3	1	1	1	0	1	1	1	1	1	1	1	1	1
CO2	0	0	0	0	0	0	0	2	3	1	3	1	0	0
CO3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
CO4	1	3	1	1	1	1	1	1	1	1	1	1	1	1
CO5	1	1	1	1	1	1	1	1	1	3	1	1	1	1
CO6	1	1	1	1	1	1	1	1	1	2	1	1	1	1

CO attainment levels

CO	Attainment level
1	2

2	**3**
3	**3**
4	**5**
5	**5**
6	**4**

Future Courses Mapping:

Semester long inturnship

Job Mapping:
What are the Job opportunities that one can get after learning this course
Core Chemical Engineering industrial job
Chemical Engineering Design job
Chemical Engg. research jobs

FF No. : 654

CH4293::INDUSTRY INTERNSHIP

Course Prerequisites:

Heat Transfer, Mass Transfer, Fluid Flow Operations, Process Calculations, Mass Transfer Operation, Separation Techniques, Chemical Reaction Engineering, Instrumentation and Process Control, Transport Phenomena

Guidelines:

1. HOD to constitute a committee of four senior faculty members for Internship allocation.
2. Students need to maintain minimum attendance of 75% at the place of work and produce
3. Digital record duly signed by competent authority.
4. Total Internship period is minimum 16 weeks or 4 months.
5. Internship undertaken is to be Industrial Internship.
6. Students need to submit monthly reports to Company and Institute.
7. Final presentation (CVV) would be conducted at the end of semester.
8. Distribution of credits and other guidelines are subject to change.

Course Outcomes:

The student will be able to –

1. Apply Chemical Engineering knowledge
2. Design equipment's or process for chemical engineering plants
3. Apply knowledge in core and multidisciplinary field though research and development.
4. Work effectively as member or leader in team.
5. Organize, comprehend and write technical report.
6. Follow ethics and professional standards of organization/industry.

FF No. : 654

CH4291::RESEARCH INTERNSHIP

Course Prerequisites:

Heat Transfer, Mass Transfer, Fluid Flow Operations, Process Calculations, Mass Transfer Operation, Separation Techniques, Chemical Reaction Engineering, Instrumentation and Process Control, Transport Phenomena

Guidelines:

1. HOD to constitute a committee of four senior faculty members for Internship allocation.
2. Students need to maintain minimum attendance of 75% at the place of work and produce
digital record duly signed by competent authority.
3. Total Internship period is minimum 16 weeks or 4 months.
4. Internship undertaken is to be Research Internship.
5. Students need to submit monthly reports on Research Project.
6. Final presentation (CVV) would be conducted at the end of semester.
7. Distribution of credits and other guidelines are subject to change.

Course Outcomes:

The student will be able to –

1. Apply Chemical Engineering knowledge

2. Design equipments or process for chemical engineering plants
3. Apply knowledge in core and multidisciplinary field though research and development.
4. Work effectively as member or leader in team.
5. Organize, comprehend and write technical report.
6. Follow ethics and professional standards of organization/industry.

FF No. : 654

CH4294::INTERNATIONAL INTERNSHIP

Course Prerequisites:

Heat Transfer, Mass Transfer, Fluid Flow Operations, Process Calculations, Mass Transfer Operation, Separation Techniques, Chemical Reaction Engineering, Instrumentation and Process Control, Transport Phenomena

Guidelines:

1. HOD to constitute a committee of four senior faculty members for Internship allocation.
2. Students need to maintain minimum attendance of 75% at the place of work and produce
digital record duly signed by competent authority.
3. Total Internship period is approximately 16 weeks or 4 months.
4. Internship undertaken to be taken outside India as Industrial Internship or Research
Internship.
5. Students need to submit monthly reports on Industry Project/Research Project.
6. Final presentation (CVV) would be conducted at the end of semester.
7. Distribution of credits and other guidelines are subject to change.

Course Outcomes:

The student will be able to –

1. Apply Chemical Engineering knowledge

2. Design equipments or process for chemical engineering plants or apply knowledge in core and multidisciplinary field though research and development
3. Work effectively as member or leader in team
4. Organize, comprehend and write technical report
5. Follow ethics and professional standards of organization/industry

FF No. : 654

CH4295::CAPSTONE PROJECT

Course Prerequisites:

Heat Transfer, Mass Transfer, Fluid Flow Operations, Process Calculations, Mass Transfer Operation, Separation Techniques, Chemical Reaction Engineering, Instrumentation and Process Control, Transport Phenomena

Guidelines:
1. HOD to constitute a committee of four senior faculty members for Internship allocation.
2. Students need to maintain minimum attendance of 75% at the place of work and
3. Produce digital record duly signed by competent authority.
4. Total Internship period is minimum 16 weeks or 4 months.
5. Internship undertaken is to be Project Internship.
6. Students need to submit monthly project report.
7. Final presentation (CVV) would be conducted at the end of semester.
8. Distribution of credits and other guidelines are subject to change.

Course Outcomes:
The student will be able to –
1. Apply Chemical Engineering knowledge
2. Design equipment's or process for chemical engineering plants
3. Apply knowledge in core and multidisciplinary field though research and development.
4. Work effectively as member or leader in team.
5. Organize, comprehend and write technical report.

6. Follow ethics and professional standards of organization/industry.

B.Tech. Chemical Structure Pattern B20 (applicable w.e.f. AY 21-22)

MINORS IN DATA SCIENCE

Subject head	Course code	Course name	Contact hours per week			Credits
			Theory	Lab	Tut	
S1	CH	DATA SCIENCE	3	2	1	5
S2	CH	OOPS	3	2	1	5
S3	CH3255	ENGINEERING APPLICATIONS OF DATA SCIENCE	3	2	1	5
S4	CH3260	DATA SCIENCE LABORATORY	-	10	-	5
		Total				20

PROGRAM OUTCOMES:

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. 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. 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. 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. 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. 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. 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. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. 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. 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. 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 STATEMENTS

Engineering Graduates will be able to:

13. Work in chemical engineering organizations demonstrating expertise in conventional chemical engineering design and operations.

14. Work in diverse, multidisciplinary fields such as biotechnology, nanotechnology, food, energy, environmental, product designs etc.