Course outcome

Name of the Faculty: Prof. S.A. Kathar *Class:* ***SE*** *Sem:* ***III***

Name of the Course: **CH201** (Engineering Mathematics-III)

CO code	Course Outcome
CH201.1	Apply the concept of Laplace Transform and inverse Laplace transform to solve initial value problems.
CH201.2	Demonstrate ability to manipulate matrices and compute eigenvalues and eigenvectors.
CH201.3	Applyconcepts of probability and probability distribution.
CH201.4	Apply concepts of sampling theory and correlation, regression to engineering problems.
CH201.5	Use complex variable theory, applications of harmonic conjugate to get orthogonal trajectories and analytic functions.
CH201.6	Create the curve by complex transformation from z plane to w plane.

CO-PO and CO-PSO Mapping

CO code	**Program Outcomes (PO)**												**PSO**		
	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PSO**	**PSO**	**PSO**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CH201.1	3	3	1	1	-	-	-	-	-	-	-	-	2	2	2
CH201.2	3	3	2	2	-	-	-	-	-	-	-	-	2	1	1
CH201.3	3	3	2	-	-	-	-	-	-	-	-	-	1	2	2
CH201.4	3	3	2	2	-	-	-	-	-	-	-	-	2	1	2
CH201.5	3	3	2	2	-	-	-	-	-	-	-	-	2	2	3
CH201.6	2	2	1	1	-	-	-	-	-	-	-	-	1	1	2
CH201	2.83	2.83	1.66	1.6	-	-	-	-	-	-	-	-	1.6	1.5	2

Name of the Faculty: Prof. A.V. Pawar Class: **SE** Sem: **III**

Name of the Course:CH202 (Industrial and Engineering Chemistry I)

CO code	**Course Outcome**
CH202.1	Explain different theories of chemical bonding, organometallic chemistry, mechanism and application of Photochemical processes.
CH202.2	Explain the Stability of Coordination compounds, Kinetics and energy profile diagrams of reactions
CH202.3	Apply the knowledge of metal carbonyls and their properties
CH202.4	Explain the role of metalloproteins in biological processes
CH202.5	Apply the knowledge to carry out organic estimations, gravimetric analysis and handle different instruments in the laboratory.

CH202.6	Predict reaction intermediate formation and photochemical reaction.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH202.1	3	2	-	-	-	-	-	-	-	-	-	-	1	2	2
CH202.2	3	1	-	-	-	-	-	-	-	-	-	-	1	2	3
CH202.3	3	2	1	-	-	-	-	-	-	-	-	-	1	2	3
CH202.4	3	2	2	-	-	-	-	-	-	-	-	-	1	1	2
CH202.5	2	3	-	1	-	-	-	-	-	-	-	-	2	2	2
CH202.6	3	2	-	-	-	-	-	-	-	-	-	-	2	2	2
CH202	2.8	2	1.5	1	-	-	-	-	-	-	-	-	1.33	1.83	2.33

Course outcome

Name of the Faculty: Dr. N.S. Kolhe Class: **SE** Sem: **III**

Name of the Course: **CH203** (Fluid Flow Operations)

CO code	Course Outcome
CH203.1	Discuss the importance of the subject in Chemical Process Industries.
CH203.2	Compute pressure or pressure drop, flow rates etc.
CH203.3	Evaluate pressure drop and flow rates in conduits for Incompressible as well as compressible fluids.
CH203.4	Compute viscosity using different methods such as Stokes Law, Capillary viscometer.
CH203.5	Evaluate power requirements in agitation, power requirement for pumps and proper selection of pumps.
CH203.6	Discuss selections of valve used for chemical process industry

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH203.1	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH203.2	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH203.3	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH203.4	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH203.5	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH203.6	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH203	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2

Name of the Faculty: Prof. N.S. Sawale Class: **SE** Sem: **III**

Name of the Course: **CH204** (Chemical Engineering Thermodynamics-I**)**

CO code	Course Outcome
CH204.1	Apply the first Law of Thermodynamics on non-flow and flow Chemical Engineering processes
CH204.2	Compute the thermal efficiencies of various conversion devices using Second Law of Thermodynamics and entropy concepts

CH204.3	Evaluate Exergy analysis of energy systems.
CH204.4	Compute properties of real fluids using different models of equations of state and other mathematical models
CH204.5	Compute property changes of non-ideal gas systems using departure functions
CH204.6	Use thermodynamic charts and diagrams for estimation of various thermodynamic properties

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH204.1	3	3	2	-	1	-	-	-	1	1	-	1	3	1	2
CH204.2	3	3	2	-	1	-	-	-	1	1	-	1	3	2	2
CH204.3	3	3	3	-	1	-	-	-	1	1	-	1	3	2	2
CH204.4	3	3	3	-	1	-	-	-	1	1	-	1	3	2	2
CH204.5	3	3	3	-	1	-	-	-	1	1	-	1	3	2	2
CH204.6	3	3	3	-	1	-	-	-	1	1	-	1	3	2	2
CH204	3	3	2.67	-	1	-	-	-	1	1	-	1	3	1.83	2

Course outcome

Name of the Faculty: Dr. N. S. Kolhe Class: **SE** Sem: **III**

Name of the Course: **CH205 (Process Calculations)**

CO Code	Course Outcome
CH205.1	Apply various systems of units and conversion from one system to another and chemical composition, chemical arithmetic and various gas laws.
CH205.2	Identify the material balance of various unit operations for steady state operations and unsteady operations with recycle, bypass and purge.
CH205.3	Analyse degrees of freedom for various units.
CH205.4	Compute material balance of chemical reactions including recycle, bypass and purge.
CH205.5	Evaluate energy balances on various process equipments with and without reactions and also NCV and GCV.
CH205.6	Apply mass and energy balances for various unit operations and also for flow sheeting calculations.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH205.1	3	3	1	-	-	2	2	1	-	2	1	-	3	2	3
CH205.2	3	3	1	-	1	1	3	2	-	1	1	-	3	2	3
CH205.3	1	1	1	-	1	-	-	-	-	1	-	-	3	2	3
CH205.4	3	3	1	-	1	1	3	2	-	1	1	-	3	2	3
CH205.5	3	3	1	-	1	2	3	2	-	1	1	-	3	2	3
CH205.6	3	3	1	-	1	2	3	2	-	2	1	-	3	2	3
CH 205	2.7	2.7	1	-	1	1.6	2.8	1.8	-	1.3	1	-	3	2	3

Name of the Faculty: Prof. Nishant Sawale Class: SE Sem: III (R-19)

Name of the Course: CH206 (Basic Chemical Engineering lab)

CO code	Course Outcome
CH206.1	Apply basic principles of chemistry and chemical engineering to solve and analyze complex industrial problems

CH206.2	Apply mathematical skills to perform calculations on data obtained and use required formulas to do the same
CH206.3	Evaluate sampling methods, required sampling size and reduce measurement errors for accurate experimental design
CHL206.4	Estimate experimental data by different data analysis methods on PC using MS Excel for investigating complex problems
CHL206.5	Examine and interpret the results obtained from experiments
CHL206.6	Design new laboratory experiments to study industrial problems which will benefit society and environment by following strict ethical standards

CO-PO and CO-PSO Mapping

CO code	**Program Outcomes (PO)**												**PSO**		
	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PSO**	**PSO**	**PSO**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CH206.1	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH206.2	2	2	1	-	-	-	2	-	1	1	-	1	2	2	2
CH206.3	2	2	2	-	-	-	2	-	1	1	-	1	2	2	1
CH206.4	2	2	2	-	-	-	1	-	1	1	-	1	2	2	2
CH206.5	2	2	2	-	-	-	2	-	1	1	-	1	2	1	2
CH206.6	2	2	1	-	-	-	2	-	1	1	-	1	2	2	2
CH206	2	2	1.66	-	-	-	1.83	-	1	1	-	1	2	1.83	1.83

Course outcome

Name of the Faculty: Prof. A.V. Pawar Class: **SE** Sem: **III**

Name of the Course: **CH207 (Industrial and Engineering Chemistry-I Lab)**

CO code	Course Outcome
CH207.1	Explain different theories of chemical bonding, organo metallic chemistry, mechanism and application of Photochemical processes.
CH207.2	Explain the Stability of Coordination compounds,Kinetics and energy profile diagrams of reactions
CH207.3	Apply the knowledge of metal carbonyls and their properties
CH207.4	Explain the role of metallo proteins in biological processes
CH207.5	Apply the knowledge to carry out organic estimations, gravimetric analysis and handle different instruments in the laboratory.
CH207.6	Evaluate and apply reaction intermediate formation and photochemical reaction.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH207.1	3	2	-	-	-	-	-	-	-	-	-	-	1	2	2
CH207.2	3	1	-	-	-	-	-	-	-	-	-	-	1	2	3
CH207.3	3	2	1	-	-	-	-	-	-	-	-	-	1	2	3
CH207.4	3	2	2	-	-	-	-	-	-	-	-	-	1	1	2
CH207.5	2	3	-	1	-	-	-	-	-	-	-	-	2	2	2
CH207.6	3	2	-	-	-	-	-	-	-	-	-	-	2	2	2
CH207	2.8	2	1.5	1									1.33	1.83	2.33

Name of the Faculty: Dr. N.S. Kolhe Class: **SE** Sem: **III**

Name of the Course: **CH208 Chemical Engg. Lab** I (FFO Lab.)

CO code	Course Outcome
CH208.1	Discuss the importance of the subject in Chemical Process Industries.
CH208.2	Compute pressure or pressure drop, flow rates etc.
CH208.3	Evaluate pressure drop and flow rates in conduits for Incompressible as well as compressible fluids.

CH208.4	Compute viscosity using different methods such as Stokes Law, Capillary viscometer.
CH208.5	Evaluate power requirements in agitation, power requirement for pumps and proper selection of pumps.
CH208.6	Discuss selections of valve used for chemical process industry

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH208.1	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH208.2	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH208.3	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH208.4	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH208.5	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH208.6	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH208	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2

Name of the Faculty: Dr. C.K. Mistry Class: **SE** Sem: **III**

Name of the Course: **CH209** (Chemical Technology Laboratory : Skill Based Laboratory**)**

CO code	Course Outcome
CH209.1	Identify the major Chemical Process Industries and Industrially Important Products and explain the Natural Product Industries.
CH209.2	Explain the Laboratory Preparation of Industrially Important Chemical Compounds and Products.
CH209.3	Outline the processes used for the Manufacture of Acids and Fertilizers.
CH209.4	Explain the Manufacturing Processes used in the Chloro-Alkali Industries.
CH209.5	Explain the Basic Building Blocks of the Petrochemical Industry.
CH209.6	Discuss the Synthesis of Important Heavy Organic Chemicals and Intermediates and outline the processes used for the Synthesis of Polymers.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH209.1	2	2	1	-	-	-	2	-	1	1	-	1	2	1	2
CH209.2	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH209.3	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH209.4	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH209.5	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH209.6	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH209	2	2	1.83	-	-	-	2	-	1	1	-	1	2	1.83	2

Name of the Faculty: Prof. S.A. Kathar Class: **SE** Sem: **III**

Name of the Course: CH210 - Engineering Mathematics-III (T)

CO code	Course Outcome
CH210.1	Apply concept of Laplace Transform and inverse Laplace transform to solve initial value problems.
CH210.2	Demonstrate ability to manipulate matrices and compute eigen values and eigen vectors.
CH210.3	Apply concept of probability and probability distribution.
CH210.4	Apply concept of sampling theory and correlation, regression to engineering problems.
CH210.5	Explain the complex variable theory, applications of harmonic conjugate to get orthogonal trajectories and analytic functions.
CH210.6	Create the image of the curve by complex transformation from z plane to w plane.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH210.1	3	3	1	1	-	-	-	-	-	-	-	-	2	2	2
CH210.2	3	3	2	2	-	-	-	-	-	-	-	-	2	1	1
CH210.3	3	3	2	-	-	-	-	-	-	-	-	-	1	2	2
CH210.4	3	3	2	2	-	-	-	-	-	-	-	-	2	1	2

CH210.5	3	3	2	2	-	-	-	-	-	-	-	-	2	2	3
CH210.6	2	2	1	1	-	-	-	-	-	-	-	-	1	1	2
CH210	2.83	2.83	1.66	1.6	-	-	-	-	-	-	-	-	1.6	1.5	2

Course outcome

Name of the Faculty: Prof. L. Chandramohan Class: **SE** Sem: **IV**

Name of the Course:CH211 Engineering Mathematics-IV

CO code	Course Outcome
CH211.1	Demonstrate ability of using Fourier series in solving PDE.
CH211.2	Demonstrate ability of using Fourier Transform in solving PDE.
CH211.3	Use finite Differences Approximations to solve boundary value problem using Finite Differences Approximations.
CH211.4	Identify the applicability of theorems and evaluate the contour integrals.
CH211.5	Evaluate the contour integrals using residues.
CH211.6	Apply the knowledge for any further course on optimization.

CO-PO and CO-PSO Mapping

CO code	**Program Outcomes (PO)**												**PSO**		
	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 1**	**PSO 2**	**PSO 3**
CH211.1	3	3	1	1	-	-	-	-	-	-	-	-	1	2	2
CH211.2	3	3	2	2	-	-	-	-	-	-	-	-	1	2	3
CH211.3	3	3	2	-	-	-	-	-	-	-	-	-	1	2	3
CH211.4	3	3	2	2	-	-	-	-	-	-	-	-	1	1	2
CH211.5	3	3	2	2	-	-	-	-	-	-	-	-	2	2	2
CH211.6	2	2	1	1	-	-	-	-	-	-	-	-	2	2	2
CH211	2.83	2.83	1.66	1.6	-	-	-	-	-	-	-	-	1.33	1.83	2.33

Name of the Faculty: Prof. A.V. Pawar Class: **SE** Sem: **IV**

Name of the Course: CH212 Industrial and Engineering Chemistry II

CO code	**Course Outcome**
CH212.1	Explain the role of different conductivity cells anddifferent tirimetric methods and solvent extractions.
CH212.2	Identify the organic and inorganic biological compound by the use of spectrophotometer
CH212.3	Apply the knowledge of thecolloidal phenomenon in food industry and pesticides.
CH212.4	Identify the significance of rearrangement reactions, active methylene group

CH212.5	Predict and synthesize different products by learningreaction mechanism.
CH212.6	Apply the knowledge of Qualitative (Analysis) and Quantitative(estimations) methods in the laboratory.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH212.1	3	2	-	-	-	-	-	-	-	-	-	-	2	2	2
CH212.2	3	2	-	-	-	-	-	-	-	-	-	-	2	1	1
CH212.3	2	1	2	-	-	-	-	-	-	-	-	-	1	2	2
CH212.4	3	2	1	-	-	-	-	-	-	-	-	-	2	1	2
CH212.5	3	1	1	1	-	-	-	-	-	-	-	-	2	2	3
CH212.6	2	2	1	1	-	-	-	-	-	-	-	-	1	1	2
CH212	2.66	1.66	1.25	1	-	-	-	-	-	-	-	-	1.66	1.5	2

Course outcome

Name of the Faculty: Dr. C.K. Mistry Class: **SE** Sem: **IV**

Name of the Course: **CH213**Chemical Engineering Thermodynamics-II

CO code	Course Outcome
CH213.1	Apply the First law and Second law of Thermodynamics.
CH213.2	Analyze the problems of phase equilibrium and reaction equilibrium.
CH213.3	Evaluate the refrigerant flow rate for a given duty of refrigeration.
CH213.4	Evaluate the compressor sizes and loads for refrigeration.
CH213.5	Utilize the calculations of phase equilibria and apply it as a fundamental concept for design of mass transfer equipment.
CH213.6	Apply the methods for estimation of Thermodynamic properties.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH213.1	3	3	2	-	1	-	-	-	1	1	-	1	3	1	2
CH213.2	3	3	3	-	1	-	-	-	1	1	-	1	3	2	2
CH213.3	3	3	3	-	1	-	-	-	1	1	-	1	3	2	2
CH213.4	3	3	3	-	1	-	-	-	1	1	-	1	3	2	2
CH213.5	3	3	3	-	3	-	-	-	1	1	-	1	3	2	2
CH213.6	3	3	2	-	3	-	-	-	1	1	-	1	3	2	2
CH213	3	3	2.67	-	1.66	-	-	-	1	1	-	1	3	1.83	2

Name of the Faculty: Prof. N.S. Sawale Class: **SE** Sem: **IV**

Name of the Course: **CH214** Solid Fluid Mechanical Operations

CO code	Course Outcome
CH214.1	Apply and analyze the concept of particle size analysis and size reduction.
CH214.2	Apply and analyze the concept of flow through packed bed, fluidization and filtration

CH214.3	Identify the scope of subjects in Chemical Industry
CH2014.4	Discuss and analyze the concept of sedimentation and gas- solid separation.
CH214.5	Apply the concept of solid mixing, solid storage & conveying, size enlargement.
CH214.6	Plan to use the basic knowledge in particle technology (particle size, shape, specific surface) and concept of particle size measurement and distribution

CO-PO and CO-PSO Mapping

CO code	**Program Outcomes (PO)**												**PSO**		
	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PSO**	**PSO**	**PSO**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CH214.1	1	2	3	-	-	2	-	2	-	-	-	-	2	1	2
CH214.2	2	2	3	-	-	2	-	2	-	-	-	-	2	2	2
CH214.3	2	2	3	-	-	2	-	2	-	-	-	-	2	2	2
CH214.4	2	2	3	-	-	2	-	2	-	-	-	-	2	2	2
CH214.5	2	2	3	-	-	2	-	2	-	-	-	-	2	2	2
CH214.6	2	2	2	-	-	2	-	2	-	-	-	-	2	2	2
CH214	1.83	2	2.83	-	-	2	-	2	-	-	-	-	2	1.83	2

Course outcome

Name of the Faculty: Mr. Anand Ingle Course Code: CH215

Course Name: Numerical Methods in Chemical Engineering

Course	Numerical Methods in Chemical Engineering	Course Code	CH215	Course Teacher	Prof. Anand A. Ingle
Course Outcomes (CO)					
CH215.1	Solve linear algebraic equations.				
CH215.2	Solve nonlinear algebraic equations.				
CH215.3	Solve using Curve fitting				
CH215.4	Solve Ordinary Differential equations				
CH215.5	Solve Partial Differential equations				
CH215.6	Solve Chemical engineering problems with numerical analysis techniques.				

Course outcome

NMCE (CH215) CO PO Matrix

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH215.1	3	3	1	3	1										1
CH215.2	3	3	2	3	2										2
CH215.3	3	3	3	3	3										1
CH215.4	3	3	2	3	2										2
CH215.5	3	3	2	3	2										2
CH215.6	3	3	3	3	3	2									3
CH215	3	3	2.16	3	2.16	1									1.83

Name of the Faculty: Dr. N.S. Kolhe Class: **SE** Sem: **IV**

Name of the Course: **CH216** (Skill Based Laboratory: Design Calculation of Auxiliary Plant Equipment**)**

CO code	Course Outcome
CH216.1	Discuss unit conversion and apply to chemical engineering problems.
CH216.2	Identify the basic function and design of steam trap.
CH216.3	Understand the pressure vessels and its design.
CH216.4	Explain various characteristics and power requirement of pumps.
CH216.5	Explain use of Psychrometric chart for properties of water and steam.
CH216.6	Discuss the theoretical concepts from process calculation

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH216.1	2	2	2	-	-	-	2	-	1	1	-	1	2	1	2

CH216.2	2	2	2	-	-	-	1	-	1	1	-	1	2	2	2
CH216.3	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH216.4	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH216.5	2	2	1	-	-	-	2	-	1	1	-	1	2	2	2
CH216.6	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH216	2	2	1.83	-	-	-	1.83	-	1	1	-	1	2	1.83	2

Name of the Faculty: Dr. Sunita Shinde Class: **SE** Sem: IV

Name of the Course: **CH217 Industrial and Engineering Chemistry-II Lab**

CO code	Course Outcome
CH217.1	Explain the role of different conductivity cells and different tirimetric methods and solvent extractions.

CH217.2	Identify the organic and inorganic biological compound by the use of spectrophotometer
CH217.3	Apply the knowledge of colloidal phenomenon in food industry and pesticides.
CH217.4	Identify the significance of rearrangement reactions, active methylene group
CH217.5	Predict and synthesize different products by learning reaction mechanism.
CH217.6	Apply the knowledge of Qualitative (Analysis) and uantitative(estimations) methods in the laboratory.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH217.1	3	2	-	-	-	-	-	-	-	-	-	-	2	2	2
CH217.2	3	2	-	-	-	-	-	-	-	-	-	-	2	1	1
CH217.3	2	1	2	-	-	-	-	-	-	-	-	-	1	2	2
CH217.4	3	2	1	-	-	-	-	-	-	-	-	-	2	1	2
CH217.5	3	1	1	1	-	-	-	-	-	-	-	-	2	2	3
CH217.6	2	2	1	1	-	-	-	-	-	-	-	-	1	1	2
CH217	2.66	1.66	1.25	1									1.66	1.5	2

Name of the Faculty: Prof. Prajakta Angre

Class: **SE** Sem: IV

Name of the Course: **CH218** (Solid Fluid Mechanical Operation - Laboratory)

CO code	Course Outcome
CH218.1	Apply the concept of size analysis & screen effectiveness
CH218.2	Analyze the light & heavy material through cyclone separator

CH218.3	Explain the concept of reduction of large particles into a small size.
CH218.4	Explain the sedimentation in effluent treatment plant.
CH218.5	Identify the importance of liquid & solid material by way of filtration.
CH218.6	Utilize and access theequipments for preparation of paint.

CO-PO and CO-PSO Mapping

Course	Numerical Methods in Chemical Engineering Lab	Course Code	CHL402	Course Teacher	Prof. Anand A. Ingle

CO code	**Program Outcomes (PO)**												**PSO**		
	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PSO**	**PSO**	**PSO**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CH218.1	2	2	1	--	1	--	--	--	--	--	--	--	2	2	1
CH218.2	1	1	2	--	2	--	--	--	--	--	--	--	1	1	2
CH218.3	1	2	3	--	1	--	--	--	--	--	--	--	2	2	1
CH218.4	2	2	1	--	2	--	--	--	--	--	--	--	1	1	2
CH218.5	2	2	3	1	--	--	--	--	--	--	--	--	2	1	1
CH218.6	1	3	1	1	--	--	--	--	--	--	--	--	1	2	2
CH218	1.5	2	1.833		1.5	--	--	--	--	--	--	--	1.5	1.5	1.5

Name of the Faculty: Prof. Anand A. Ingle Class: **SE** Sem: **IV**

Course Code: CH219

Course Name: Numerical Methods in Chemical Engineering Lab

Course outcome

Course Outcomes (CO)	
CH219.1	Solve linear algebraic equations.
CH219.2	Solve nonlinear algebraic equations.
CH219.3	Solve using Curve fitting
CH219.4	Solve Ordinary Differential equations
CH219.5	Solve Partial Differential equations
CH219.6	Solve Chemical engineering problems with numerical analysis techniques.

NMCE LAB (CH219) CO PO Matrix

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH219.1	3	3	1	3	1										1
CH219.2	3	3	2	3	2										2
CH219.3	3	3	3	3	3										1
CH219.4	3	3	2	3	2										2
CH219.5	3	3	2	3	2										2
CH219.6	3	3	3	3	3	2									3
CH219	3	3	2.16	3	2.16	1									1.83

Course outcome

Name of the Faculty: Prof. L. Chandramohan Class: **SE** Sem: **IV**

Name of the Course:CH220 Engineering Mathematics-IV (T)

CO code	Course Outcome
CH220.1	Demonstrate ability of using Fourier series in solving PDE.
CH220.2	Demonstrate ability of using Fourier Transform in solving PDE.
CH220.3	Explain boundary value problem using Finite Differences Approximations.
CH220.4	Identify the applicability of theorems and evaluate the contour integrals.
CH220.5	Evaluate the contour integrals using residues.
CH220.6	Apply the knowledge of optimization for any further course on optimization.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH220.1	3	3	1	1	-	-	-	-	-	-	-	-	1	2	2
CH220.2	3	3	2	2	-	-	-	-	-	-	-	-	1	2	3
CH220.3	3	3	2	-	-	-	-	-	-	-	-	-	1	2	3
CH220.4	3	3	2	2	-	-	-	-	-	-	-	-	1	1	2
CH220.5	3	3	2	2	-	-	-	-	-	-	-	-	2	2	2
CH220.6	2	2	1	1	-	-	-	-	-	-	-	-	2	2	2
CH220	2.83	2.83	1.66	1.6	-	-	-	-	-	-	-	-	1.33	1.83	2.33

Course outcome

Name of the Faculty: Dr. C.K. Mistry Class: **TE** Sem: **V**

Name of the Course: **CH301** (Advanced Material Science –Department Optional Course 1**)**

CO code	Course Outcome
CH301.1	Identify various types of advanced materials such as polymers, ceramics and composites.
CH301.2	Evaluate and utilize the properties of various polymeric, ceramic and metallic materials and discuss their applications in various fields.
CH301.3	Select and analyze different types of composite materials, their properties and applications.
CH301.4	Explain the fabrication of various composite materials.
CH301.5	Outline the types of nanotubes and nanosensors and their applications.
CH301.6	Evaluate the thin film coating methods and discuss their applications in various fields.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH301.1	2	2	1	-	-	-	1	-	1	1	-	1	2	1	2
CH301.2	2	2	1	-	-	-	1	-	1	1	-	1	2	1	2
CH301.3	2	2	1	-	-	-	1	-	1	1	-	1	2	2	2
CH301.4	2	2	1	-	-	-	1	-	1	1	-	1	2	2	2
CH301.5	2	2	1	-	-	-	1	-	1	1	-	1	2	2	2
CH301.6	2	2	1	-	-	-	1	-	1	1	-	1	2	2	2
CH301	2	2	1	-	-	-	1	-	1	1	-	1	2	1.67	2

Course outcome

Name of the Faculty: Prof. Y. A. Karpe Class: **TE** Sem: **V**

Name of the Course: **CH302** (Mass Transfer Operation -I**)**

CO code	Course Outcome
CH302.1	Analyze the fundamentals of the relationship between fluid flow, convection heat transfer and mass transfer.
CH302.2	Apply the concept and operation of various types of gas-liquid contacts equipment.
CH302.3	Discuss the desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety, manufacturability and sustainability.
CH302.4	Evaluate NTU, HTU, HETP and height of packed bed used for Absorption and Humidification operations.
CH302.5	Demonstrate knowledge of mass transfer by applying principles of diffusion, mass transfer coefficients, and interphase mass transfer.
CH302.6	Evaluate the time required for drying and design of drying equipments.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH302.1	2	2	2	-	-	-	2	-	1	-	-	-	1	2	1
CH302.2	2	2	3	-	-	-	2	-	1	-	-	-	2	2	2
CH302.3	2	2	3	-	-	-	2	-	1	-	-	-	2	2	2
CH302.4	2	2	3	-	-	-	2	-	1	-	-	-	3	2	2
CH302.5	2	2	3	-	-	-	2	-	1	-	-	-	2	2	2
CH302.6	2	2	2	-	-	-	2	-	1	-	-	-	2	2	2
CH302	2	2	2.67	-	-	-	2	-	1	-	-	-	2	2	1.83

Name of the Faculty: Prof. U.W. Khandalkar Class: **TE** Sem: **V**

Name of the Course: CH3**03** HEAT TRANSFER OPERATIONS

CH303.1	Demonstrate rate of heat transfer by all three modes of heat transfer.
CH303.2	Apply basic principles involved in mechanism and calculation of heat transfer rates.
CH303.3	Explain the most common types of unsteady state operations of heat transfer.
CH303.4	Explain heat transfer through extended surfaces
CH303.5	Design Heat Exchangers
CH303.6	Explain radiation in heat transfer

CO-PO and CO-PSO Mapping

CO code	**Program Outcomes (PO)**												**PSO**		
	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PSO**	**PSO**	**PSO**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CH303.1	**2**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**1**
CH303.2	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**
CH303.3	**1**	**2**	**3**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**1**
CH303.4	**2**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**2**
CH303.5	**2**	**2**	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**1**
CH303.6	**2**	**3**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**2**
CH303	**1.833**	**2**	**1.833**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1.5**	**1.833**	**1.5**

Name of the Faculty: Prof. Nishant Sawale Class: **TE** Sem: V

Name of the Course: **CH304** (Chemical Reaction Engineering I**)**

CO code	**Course Outcome**
CH304.1	Analyze the kinetics of homogeneous systems

CH304.2	Explain different methods of analysis of experimental data
CH304.3	Apply the knowledge to develop kinetics models for different types of homogeneous reactions.
CH304.4	Apply the knowledge to develop the design equations of various reactors (Batch, PFR & CSTR).
CH304.5	Discuss the different arrangement of reactors in series and parallel.
CH304.6	Identify the effect of temperature on reactor performance for adiabatic and non-adiabatic operation and predict the kinetic model to design the reactors for adiabatic and non-isothermal operations.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH304.1	2	2	1	--	--	--	--	--	--	--	--	--	2	2	1
CH304.2	2	1	2	--	--	--	--	--	--	--	--	--	1	1	2
CH304.3	1	2	3	--	2	--	--	--	--	--	--	--	2	2	1
CH304.4	2	2	1	--	--	--	--	--	--	--	--	--	1	2	2
CH304.5	2	2	3	1	--	--	--	--	--	--	--	--	2	2	1
CH304.6	2	3	1	1	--	--	--	--	--	--	--	--	1	2	2
CH304	1.833	2	1.833	1	--	--	--	--	--	--	--	--	1.5	1.833	1.5

Name of the Faculty: Dr. Arati Barik Class: **TE** Sem: **V**

Name of the Course: **CH305** (Transport Phenomena**)**

CO code	Course Outcome
CH305.1	The student understands transport properties and analyze the mechanisms of molecular momentum, energy and mass transport.
CH305.2	The students can establish and simplify appropriate conservation statements for momentum, energy and mass transfer processes.
CH305.3	The students can formulate the differential forms of the equations of change for momentum, heat and mass transfer problems
CH305.4	The students can solve various industrial problems based on momentum, energy and mass transfer analysis.

CH305.5	The students understand conservation principles and appropriate boundary conditions in transport processes.
CH305.6	The student can apply conservation principles, along with appropriate boundary conditions for designing and optimizing parameters of industrial equipment based on different transport processes.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH305.1	3	2	2	-	1	-	-	-	1	1	-	1	3	1	2
CH305.2	3	3	3	-	1	-	-	-	1	1	-	1	3	2	2
CH305.3	3	3	3	-	1	-	-	-	1	1	-	1	3	2	2
CH305.4	3	3	3	-	1	-	-	-	1	1	-	1	3	2	2
CH305.5	3	2	3	-	1	-	-	-	1	1	-	1	3	2	2
CH305.6	3	3	2	-	1	-	-	-	1	1	-	1	3	2	2
CH305	3	2.67	2.67	-	1	-	-	-	1	1	-	1	3	1.83	2

Name of the Faculty: Prof. Sreedevi Nair Class: **TE** Sem: **V**

Name of the Course: **CH306** (Skill Based Lab. : Professional Communication and Ethics II**)**

CO code	Course Outcome
CH306.1	Plan and Prepare effective business/technical documents which will in turn provide solid foundation for their future managerial roles.
CH306.2	Strategize their personal and professional skills to build a professional image and meet the demands of the industry.
CH306.3	Emerge successful in group discussions, meetings and result-oriented agreeable solutions in group communication situations.
CH306.4	Deliver persuasive and professional presentations.
CH306.5	Develop creative thinking and interpersonal skills required for effective professional communication.
CH306.6	Apply codes of ethical conduct, personal integrity and norms of organizational behaviour.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH306.1	1	-	-	-	-	1	1	3	2	3	-	1	1	1	1
CH306.2	1	-	-	-	-	1	1	3	2	3	-	1	1	1	1
CH306.3	1	-	-	-	-	1	1	3	2	3	-	1	1	1	1
CH306.4	1	-	-	-	-	1	1	3	2	3	-	1	1	1	1
CH306.5	1	-	-	-	-	1	1	3	2	3	-	1	1	1	1
CH306.6	1	-	-	-	-	1	1	3	2	3	-	1	1	1	1
CH306	1	-	-	-	-	1	1	3	2	3	-	1	1	1	1

Name of the Faculty: Prof. Y. A. Karpe Class: **TE** Sem: **V**

Name of the Course: **CH307** (MTO-I Laboratory)

CO code	Course Outcome
CH307.1	Demonstrate the fundamentals of the relationship between fluid flow, convection heat transfer and mass transfer operation.
CH307.2	Compile and compare the concept and operation of various types of gas-liquid contacts equipment.
CH307.3	Evaluate the efficiency of cooling tower.
CH307.4	Evaluate NTU, HTU of cooling tower and height of packed bed used for Absorption and Humidification operations.
CH307.5	Identify the rate of diffusion and mass transfer coefficients.
CH307.6	Evaluate the time required for drying and design of drying equipment.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH307.1	2	2	2	-	-	-	2	-	1	-	-	-	1	2	1
CH307.2	2	2	3	-	-	-	2	-	1	-	-	-	2	2	2
CH307.3	2	2	3	-	-	-	2	-	1	-	-	-	2	2	2
CH307.4	2	2	3	-	-	-	2	-	1	-	-	-	3	2	2
CH307.5	2	2	3	-	-	-	2	-	1	-	-	-	2	2	2
CH307.6	2	2	2	-	-	-	2	-	1	-	-	-	2	2	2
CH307	2	2	2.67	-	-	-	2	-	1	-	-	-	2	2	1.83

Name of the Faculty: Prof. U.W. Khandalkar
Class: **TE** Sem: V

Name of the Course: **CH308** (HTO Laboratory)

CO code	Course Outcome
CH308.1	Explain to determine the heat transfer coefficient in under unsteady state.
CH308.2	Explain to determine the overall & individual and shell side heat transfer coefficient of vertical heat exchanger
CH308.3	Explain to determine the thermal conductivity of the given metal test piece.
CH308.4	Explain to determine the emissivity of given test plate
CH308.5	Explain to determine the overall & individual heat transfer coefficient in an agitated vessel under steady state conditions.
CH308.6	Explain to determine overall & individual heat transfer coefficient of double pipe heat exchanger.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH308.1	1	2	2	--	1	--	--	--	1	--	--	--	1	1	1
CH308.2	2	2	1	--	1	--	--	--	--	1	--	--	2	2	2
CH308.3	2	2	3	--	1	--	--	--	1	1	--	--	3	2	2
CH308.4	2	2	2	--	1	--	--	--	1	1	--	--	2	2	3
CH308.5	2	2	2	--	1	--	--	--	--	1	--	--	2	1	2
CH308.6	2	2	1	--	1	--	--	--	1	-	--	--	2	2	2
CH308	1.833	2	1.833	--	1	--	--	--	1	1	--	--	2	1.66	2

Name of the Faculty: Prof. Nishant Sawale Class: **TE** Sem: V

Name of the Course: **CH309** (CRE I Laboratory)

CO code	Course Outcome
CH309.1	Evaluate rate constant and order of reaction at room temperature using differential & integral method of analysis.
CH309.2	Evaluate activation energy using Arrhenius, Collision and Transition state theory.
CH309.3	Identify conversion in batch reactor at time t
CH309.4	Identify theoretical and experimental conversion in Plug flow and mixed flow reactor.
CH309.5	Identify conversion in PFR – CSTR combination and evaluate order of reaction when reaction is pseudo first order.
CH309.6	Predict order of reaction using half life method and will be able to study acidic hydrolysis.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3

CH309.1	2	2	1	--	2	--	--	--	1	--	--	--	2	2	1
CH309.2	2	1	2	--	2	--	--	--	1	--	--	--	1	1	2
CH309.3	1	2	3	--	2	--	--	--	1	--	--	--	2	2	1
CH309.4	2	2	1	--	2	--	--	--	1	--	--	--	1	2	2
CH309.5	2	2	3	1	2	--	--	--	1	--	--	--	2	2	1
CH309.6	2	3	1	1	2	--	--	--	1	--	--	--	1	2	2
CH309	1.833	2	1.833	1	2	--	--	--	1--	--	--	--	1.5	1.833	1.5

Name of the Faculty: Prof. Y. A. Karpe Class: **TE** Sem: **VI**

Name of the Course: **CH310** Pollution Control Technology

CO code	Course Outcome
CH310.1	Identify sources, types of pollutants and determine their impact on the environment, related laws and standards.
CH310.2	To understand sampling, measurement of various water pollutants, natural purification process, design various waste water treatments methods.
CH310.3	Analyze sampling, measurements, meteorological aspects air pollutant dispersion, its control and equipment's used for air pollution control
CH310.4	To manage solid waste and noise pollution control.
CH310.5	Analyze and select appropriate treatment process for specific effluents emerging from chemical industries.
CH310.6	To minimize use of resources in chemical industries.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH310.1	2	2	1	-	-	-	2	-	1	1	-	1	2	1	2
CH310.2	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH310.3	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH310.4	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH310.5	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH310.6	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH310	2	2	1.83	-	-	-	2	-	1	1	-	1	2	1.83	2

Name of the Faculty: Dr. Arati Barik Class: **TE** Sem: **VI**

Name of the Course: **CH311** Mass transfer Operations –II (MTO-II)

CO code	Course Outcome
CH311.1	Analyze equilibrium in all separation process
CH311.2	Identify and understand various mass transfer equipments and their operation
CH311.3	Design various mass transfer equipments such as distillation column, extraction column and adsorption equipments etc.
CH311.4	Select and analyze the separation operation which will be economical for the process
CH311.5	Evaluate and optimize the process parameters
CH311.6	Demonstrate membrane separation processes, their principles and working

Course outcome

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH311.1	3	3	2		1	-	-	-	1	1	-	1	3	2	2
CH311.2	3	3	1	-	1	-	-	-	1	1	-	1	3	3	2
CH311.3	3	3	3	-	1	-	-	-	1	1	-	1	3	3	2
CH311.4	3	3	3	-	1	-	-	-	1	1	-	1	3	3	2
CH311.5	3	3	3	-	1	-	-	-	1	1	-	1	3	3	2
CH311.6	2	2	2	-	1	-	-	-	1	1	-	1	3	3	2
CH311	2.83	2.83	2.33	-	1	-	-	-	1	1	-	1	3	2.83	2

Name of the Faculty: Prof. Prajakta Angre Class: **TE** Sem: **VI**

Name of the Course: **CH312** (Process Engineering and Economics**)**

CO code	Course Outcome
CH312.1	Understand the functions of process engineering and various approaches of chemical process design.
CH312.2	To calculate different types of interests and annual depreciation costs using different methods.
CH312.3	To draw various flow diagrams and carry out process design of piping and various flow moving devices.
CH312.4	To carry out process design of multicomponent distillation and absorption columns using various approaches.
CH312.5	Evaluate basic design aspects of major process equipment, carry out their quick cost estimation and demonstrate their knowledge of different types of costs and capital cost estimates.
CH312.6	Demonstrate their knowledge of cash flow in an industrial operation and perform break-even and profitability analysis using different methods.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH312.1	1	2	2	-	2	-	2	-	1	-	1	-	1	2	2
CH312.2	2	2	2	-	2	-	2	-	1	-	3	-	2	2	2
CH312.3	2	1	2	-	2	-	2	-	1	-	1	-	2	2	2
CH312.4	2	2	2	-	2	-	2	-	1	-	1	-	2	2	2
CH312.5	1	2	2	-	2	-	2	-	1	-	3	-	2	2	3
CH312.6	2	2	2	-	2	-	2	-	1	-	3	-	2	2	2
CH312	1.66	1.83	2	-	2	-	2	-	1	-	2	-	1.83	2	2

Name of the Faculty: Prof. Nishant Sawale Class: **TE** Sem: VI

Name of the Course: **CH313** Chemical Reaction Engineering–II (CRE- II)

CO code	Course Outcome

Course outcome

CH313.1	Explain the kinetics & mechanism of various heterogeneous reactions & design consideration of reactors used during different operating conditions.
CH313.2	Apply the knowledge of design of solid catalyzed fluid phase reactors.
CH313.3	Demonstrate the concept of Non catalytic heterogeneous reactions.
CH313.4	Apply the knowledge of design of reactors for non catalytic reactions.
CH313.5	Demonstrate the concept of kinetics of fluid - fluid reactions.
CH313.6	Explain the concept of residence time distribution (RTD) in non-ideal reactors.

CO-PO and CO-PSO Mapping

CO code	**Program Outcomes (PO)**												**PSO**		
	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PSO**	**PSO**	**PSO**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CH313.1	2	2	2	--	1	--	--	--	--	--	--	--	1	2	1
CH313.2	1	2	3	1	1	--	--	--	--	--	--	--	1	2	2
CH313.3	2	2	1	--	--	--	--	--	--	--	--	--	2	2	1
CH313.4	1	2	2	--	1	--	--	--	--	--	--	--	1	2	2
CH313.5	2	2	2	1	1	--	--	--	--	--	--	--	2	1	2
CH313.6	2	1	2	1	3	--	--	--	--	--	--	--	1	2	2
CH313	1.66	1.833	2	1	1.4	--	--	--	--	--	--	--	1.33	1.833	1.66

Name of the Faculty: Prof. Umakant W. Khandalkar Class: **TE** Sem: **VI**

Name of the Course: **CH314** Piping Engineering (Department Optional Course 2)

CO code	Course Outcome
CH314.1	Recognize role of piping engineer.
CH314.2	Understand Pipe Material selection.
CH314.3	Choose the piping fundamentals, codes and standards
CH314.4	Select piping system components.
CH314.5	Examine piping system.
CH314.6	Choose and Design different piping drawing.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PSO**	**PSO**	**PSO**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CH314.1	3	2	2	-	-	-	2	-	1	1	-	1	3	3	2
CH314.2	3	2	2	-	-	-	2	-	1	1	-	1	3	3	2
CH314.3	3	2	2	-	-	-	2	-	1	1	-	1	3	3	2
CH314.4	3	2	2	-	-	-	2	-	1	1	-	1	3	3	2
CH314.5	3	2	2	-	-	-	2	-	1	1	-	1	3	3	2
CH314.6	3	2	2	-	-	-	2	-	1	1	-	1	3	3	2
CH314	3	2	2	-	-	-	2	-	1	1	-	1	3	3	2

Name of the Faculty: Prof. Y. A. Karpe Class: **TE** Sem: **VI**

Name of the Course: **CH315** (PCT Laboratory)

CO code	Course Outcome

Course outcome

CH315.1	Evaluate the Physical characteristics of different samples.
CH315.2	Identify various pollutants sources and evaluate adverse effects, Environmental Legislation
CH315.3	Identify meteorological aspects air pollutant dispersion, Sampling and measurement, Control Methods and Equipment.
CH315.4	Analyze Sampling, measurement of various water pollutant techniques.
CH315.5	Identify and design various Waste Water Testing techniques like BOD, COD, etc.
CH315.6	Apply the Environmental Engineering concepts to control management of various types of pollutants.

CO-PO and CO-PSO Mapping

CO code	**Program Outcomes (PO)**												**PSO**		
	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PSO**	**PSO**	**PSO**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CH315.1	2	2	1	-	-	-	2	-	1	1	-	1	2	1	2
CH315.2	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH315.3	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH315.4	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH315.5	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH315.6	2	2	2	-	-	-	2	-	1	1	-	1	2	2	2
CH315	2	2	1.83	-	-	-	2	-	1	1	-	1	2	1.83	2

Name of the Faculty: Dr. Arati Barik Class: **TE** Sem: **VI**

Name of the Course: **CH316** (MTO-II Laboratory)

CO code	Course Outcome
CH316.1	Analyze equilibrium in all separation process
CH316.2	Identify and understand various mass transfer equipment and their operation
CH316.3	Design distillation column
CH316.4	Select and analyse the separation operation which will be economical for the process
CH316.5	Evaluate and optimize the process parameters
CH316.6	Demonstrate crystallization and adsorption processes principle and working

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH316.1	3	3	2		1	-	-	-	1	1	-	1	3	2	2
CH316.2	3	3	1	-	1	-	-	-	1	1	-	1	3	3	2
CH316.3	3	3	3	-	1	-	-	-	1	1	-	1	3	3	2
CH316.4	3	3	3	-	1	-	-	-	1	1	-	1	3	3	2
CH316.5	3	3	3	-	1	-	-	-	1	1	-	1	3	3	2
CH316.6	3	3	3	-	1	-	-	-	1	1	-	1	3	3	2
CH316	3	3	2.5	-	1	-	-	-	1	1	-	1	3	2.83	2

Name of the Faculty: Prof. Nishant Sawale Class: **TE** Sem: VI

Name of the Course: **CH317** (CRE-II Laboratory)

CO code	Course Outcome
CH317.1	Explain the concept of Residence time distribution

CH317.2	Demonstrate the Pulse input and Step input methods for RTD measurement.
CH317.3	Discuss the difference between batch and semi batch reactor.
CH317.4	Demonstrate the concept of the major resistance offered to overall reaction rate.
CH317.5	Explain the concept of non-catalytic and heterogeneous catalytic reactions &Esterification reaction
CH317.6	Explain the concept of adsorption isotherm

CO-PO and CO-PSO Mapping

CO code	**Program Outcomes (PO)**												**PSO**		
	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PSO**	**PSO**	**PSO**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CH317.1	2	2	3	--	2	--	--	--	1	--	--	--	1	2	1
CH317.2	1	1	2	--	2	--	--	--	1	--	--	--	2	2	1
CH317.3	2	1	2	--	2	--	--	--	1	--	--	--	2	2	1
CH317.4	2	2	2	--	2	--	--	--	1	--	--	--	1	2	1
CH317.5	1	2	1	--	2	--	--	--	1	--	--	--	2	2	2
CH317.6	2	1	2	--	2	--	--	--	1	--	--	--	2	1	2
CH317	1.66	1.5	2	--	2	--	--	--	1	--	--	--	1.66	1.833	1.33

Name of the Faculty: Prof. Prajakta Angre Class: **TE** Sem: **VI**

Name of the Course: **CH318** (Process Engineering and Economics Tutorial**)**

CO code	Course Outcome
CH318.1	Understand the functions of process engineering and various approaches of chemical process design.
CH318.2	To calculate different types of interests and annual depreciation costs using different methods.
CH318.3	To draw various flow diagrams and carry out process design of piping and various flow moving devices.
CH318.4	To carry out process design of multicomponent distillation and absorption columns using various approaches.
CH318.5	Evaluate basic design aspects of major process equipment, carry out their quick cost estimation and demonstrate their knowledge of different types of costs and capital cost estimates.
CH318.6	Demonstrate their knowledge of cash flow in an industrial operation and perform break-even and profitability analysis using different methods.

CO-PO and CO-PSO Mapping

Course outcome

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH318.1	1	2	2	-	2	-	2	-	1	-	1	-	1	2	2
CH318.2	2	2	2	-	2	-	2	-	1	-	3	-	2	2	2
CH318.3	2	1	2	-	2	-	2	-	1	-	1	-	2	2	2
CH318.4	2	2	2	-	2	-	2	-	1	-	1	-	2	2	2
CH318.5	1	2	2	-	2	-	2	-	1	-	3	-	2	2	3
CH318.6	2	2	2	-	2	-	2	-	1	-	3	-	2	2	2
CH318	1.66	1.83	2	-	2	-	2	-	1	-	2	-	1.83	2	2

Name of the Faculty: Prof. Umakant W. Khandalkar Class: **TE** Sem: **VI**

Name of the Course: **CH319** Skill Based Lab. : Piping Design Engineering Laboratory

CO code	Course Outcome
CH319.1	To apply piping standards in design of complex piping networks.
CH319.2	To solve complex engineering problem of selection of appropriate material for pipes and fittings for chemical plants.
CH319.3	To identify, analyze and solve pipe sizing, pump sizing, valve sizing and pipe-valve-pump selection problems.
CH319.4	To design and draw piping networks, piping layout ,P & ID ,isometric drawings and plot plan by considering legal, environmental, societal and ethical aspects.
CH319.5	To use modern IT tools such as MS Excel/Libre office Calc/WPS spreadsheets, DWSIM, AutoCAD 2D and 3D,CAE demo and Edraw Fluid flow for design and analysis of piping networks.
CH319.6	To carry out stress analysis, network analysis, flexibility analysis and surge analysis for chemical plants which will benefit society and environment by following strict ethical standards.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH319.1	3	2	2	-	-	-	2	-	1	1	-	1	3	3	2
CH319.2	3	2	2	-	-	-	2	-	1	1	-	1	3	3	2
CH319.3	3	2	2	-	-	-	2	-	1	1	-	1	3	3	2
CH319.4	3	2	2	-	-	-	2	-	1	1	-	1	3	3	2
CH319.5	3	2	2	-	-	-	2	-	1	1	-	1	3	3	2
CH319.6	3	2	2	-	-	-	2	-	1	1	-	1	3	3	2
CH319	3	2	2	-	-	-	2	-	1	1	-	1	3	3	2

Course outcome

Name of the Faculty: Ms. Prajakta Angre Class: B**E** Sem: V**II**

Name of the Course: **CH401** (Process Equipment Design**)**

CO code	Course Outcome
CH401.1	Design chemical engineering project
CH401.2	Design heat exchanger
CH401.3	Design Evaporator
CH401.4	Design Tall column
CH401.5	Design High Pressure vessels
CH401.6	Design process Flow sheets.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH401.1	3	2	3	-	-	-	2	-		1	-		2	1	2
CH401.2	3	2	3	-	-	-	2	-		1	-		2	2	2
CH401.3	3	2	3	-	-	-	2	-		1	-		2	2	2
CH401.4	3	2	3	-	-	-	2	-		1	-		2	2	2
CH401.5	3	2	3	-	-	-	2	-		1	-		2	2	2
CH401.6	3	2	3	-	-	-	2	-		1	-		2	2	2
CH401	3	2	3	-	-	-	2	-		1	-		2	2	2

Name of the Faculty: Prof. Prajakta Angre Class: **BE** Sem: **VII**

Name of the Course: **CH402** (Process Engineering**)**

CO code	Course Outcome
CH402.1	Apply knowledge of mathematics, science and engineering.
CH402.2	Design a system, a component, or a process to meet the desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety, manufacturability and sustainability
CH402.3	Ability to function on multi disciplinary teams.
CH402.4	Apply of professional and ethical responsibility.
CH402.5	Identify, formulate and solve engineering problems.
CH402.6	Analyze the techniques, skills, and modern engineering tools necessary for engineering practice.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH402.1	1	2	2	-	2	-	2	-	1	-	-	-	1	2	2
CH402.2	2	2	2	-	2	-	2	-	1	-	-	-	2	2	2
CH402.3	2	1	2	-	2	-	2	-	1	-	-	-	2	2	2
CH402.4	2	2	2	-	2	-	2	-	1	-	-	-	2	2	2
CH402.5	1	2	2	-	2	-	2	-	1	-	-	-	2	2	3
CH402.6	2	2	2	-	2	-	2	-	1	-	-	-	2	2	2
CH402	1.66	1.83	2	-	2	-	2	-	1	-	-	-	1.83	2	2

Course outcome

Name of the Faculty: Dr. Arati Barik Class:**BE** Sem: **VII**

Name of the Course: **CH403** Process Dynamics and Control (PDC)

CO code	Course Outcome
CH403.1	Design dynamical systems model.
CH403.2	Compute system response for various changes in input to the system based on application of Laplace transform.
CH403.3	Design controller for controlling output of a specified system
CH403.4	Compute the stability analysis of a feedback control system based on Frequency response(Bode diagram)
CH403.5	Design the controller for fast and better response using Zeigler-Nichols tuning rules.
CH403.6	Analyze the characteristics and performance of various final control elements (control valves)

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH403.1	3	3	2	-	1	-	-	-	1	1	-	1	3	1	1
CH403.2	3	3	3	-	1	-	-	-	1	1	-	1	3	2	2
CH403.3	3	3	3	-	3	-	-	-	1	1	-	1	3	3	3
CH403.4	3	3	3	-	3	-	-	-	1	1	-	1	3	3	3
CH403.5	3	3	3	-	3	-	-	-	1	1	-	1	3	3	3
CH403.6	3	3	2	-	1	-	-	-	1	1	-	1	3	2	2
CH403	3	3	2.67	-	2	-	-	-	1	1	-	1	3	2.33	2.33

Name of the Faculty: Prof. U.W. Khandalkar Class: **BE** Sem: **VII**

Name of the Course: **CH404** Department Elective III (Petroleum Refining Technology)

CO code	Course Outcome
CH404.1	Identify the characterization of crude petroleum and petroleum refinery.
CH404.2	Analyze Importance of important physical properties of petroleum products
CH404.3	Explain the fractionation of crude petroleum into useful fractions.
CH404.4	Compare various Petroleum Refining processes & products, its evaluation & treatment techniques
CH404.5	Compare various cracking processes & its applications in Chemical industries.
CH404.6	Use treatment techniques to purify petro products and manufacture widely used petrochemicals

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH404.1	2	2	1	-	-	2	-	-	1	-	-	-	2	1	2
CH404.2	2	2	2	-	-	2	-	-	1	-	-	-	2	2	2
CH404.3	2	2	2	-	-	2	-	-	1	-	-	-	2	2	2
CH404.4	2	2	2	-	-	2	-	-	1	-	-	-	2	2	2
CH404.5	2	2	2	-	-	2	-	-	1	-	-	-	2	2	2
CH404.6	2	2	2	-	-	2	-	-	1	-	-	-	2	2	2
CH404	2	2	1.83	-	-	2	-	-	1	-	-	-	2	1.83	2

Name of the Faculty: Ms. Prajakta Angre Class: B**E** Sem: V**II**

Name of the Course: **CH405** (Process Equipment Design Lab**)**

CO code	Course Outcome

CH405.1	Design chemical engineering project
CH405.2	Design heat exchanger
CH405.3	Design Evaporator
CH405.4	Design Tall column
CH405.5	Design High Pressure vessels
CH405.6	Design process Flow sheets.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH405.1	3	2	3	-	-	-	2	-	1	1	-		2	1	2
CH405.2	3	2	3	-	-	-	2	-	1	1	-		2	2	2
CH405.3	3	2	3	-	-	-	2	-	1	1	-		2	2	2
CH405.4	3	2	3	-	-	-	2	-	1	1	-		2	2	2
CH405.5	3	2	3	-	-	-	2	-	1	1	-		2	2	2
CH405.6	3	2	3	-	-	-	2	-	1	1	-		2	2	2

Name of the Faculty: Dr. Arati Barik Class:**BE** Sem: **VII**

Name of the Course: **CH406** Chemical Engineering Lab (PDC)

CO code	Course Outcome
CH406.1	Analyzebehaviour of process systems and equipments.
CH406.2	Compute the characteristics of different types control valves.

CH406.3	Assess stability characteristics of dynamic systems
CH406.4	Use closed-loop control system for controlling process parameters.
CH406.5	Analyze the effect of controller parameters in the response of dynamic systems
CH406.6	Compute the optimized controller parameters in controller tuning process

CO-PO and CO-PSO Mapping

CO code	**Program Outcomes (PO)**												**PSO**		
	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PSO**	**PSO**	**PSO**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CH406.1	3	3	2	-	1	-	-	-	1	1	-	1	3	1	2
CH406.2	3	3	2	-	1	-	-	-	1	1	-	1	3	2	2
CH406.3	3	3	3	-	1	-	-	-	1	1	-	1	3	2	2
CH406.4	3	3	3	-	3	-	-	-	1	1	-	1	3	3	3
CH406.5	3	3	3	-	3	-	-	-	1	1	-	1	3	3	3
CH406.6	3	3	3	-	3	-	-	-	1	1	-	1	3	3	3
CH406	3	3	2.67	-	2	-	-	-	1	1	-	1	3	2.33	2.5

Course outcome

Name of the Faculty: Prof. Prajakta Angre Class: **BE** Sem: **VII**

Name of the Course: **CH407** (Process Engineering -Tutorial**)**

CO code	Course Outcome
CH407.1	Compute the Design Problem, Chemical Process Design and Integration.
CH407.2	Design a system, a component, or a process to meet the desired needs within realistic constraints.
CH407.3	Apply function on multi disciplinary teams.
CH407.4	Identify selection criteria, design of absorber including multicomponent using shortcut methods
CH407.5	Identify, formulate and solve engineering problems.
CH407.6	Use the techniques, skills, and modern engineering tools necessary for Sizing/Costing of Equipments.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH407.1	1	2	2	-	2	-	2	-	1	-	-	-	1	2	2
CH407.2	2	2	2	-	2	-	2	-	1	-	-	-	2	2	2
CH407.3	2	1	2	-	2	-	2	-	1	-	-	-	2	2	2
CH407.4	2	2	2	-	2	-	2	-	1	-	-	-	2	2	2
CH407.5	1	2	2	-	2	-	2	-	1	-	-	-	2	2	3
CH407.6	2	2	2	-	2	-	2	-	1	-	-	-	2	2	2
CH407	1.66	1.83	2	-	2	-	2	-	1	-	-	-	1.83	2	2

Name of the Faculty: Dr. C.K. Mistry Class: **BE** Sem: **VIII**

Name of the Course: **CH408** Modeling, Simulation & Optimization (MSO)

CO code	Course Outcome
CH408.1	Design and apply linear and non-linear mass and energy balance equations for individual as well as multiple units.
CH408.2	Analyze sequential and equation oriented simulation of complete flow sheets.
CH408.3	Evaluate various process simulation modes and simulation examples.
CH408.4	Demonstrate process simulation and utilize flash calculations and distillation calculations.
CH408.5	Analyze and evaluate the systems of Non-Linear Equations.
CH408.6	Demonstrate recycle partitioning and tearing, apply Constrained Non-Linear Programming and also evaluate and optimize typical chemical processes.

Course outcome

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH408.1	3	3	2	-	1	-	-	-	1	1	1	1	3	2	2
CH408.2	3	3	3	-	1	-	-	-	1	1	1	1	3	2	2
CH408.3	3	3	2	-	1	-	-	-	1	1	1	1	3	2	2
CH408.4	3	3	3	-	3	-	-	-	1	1	1	1	3	2	2
CH408.5	3	3	2	-	3	-	-	-	1	1	1	1	3	2	2
CH408.6	3	3	3	-	3	-	-	-	1	1	1	1	3	2	2
CH408	3	3	2.5	-	2	-	-	-	1	1	1	1	3	2	2

Name of the Faculty: Dr. N.S. Kolhe
Class: **BE** Sem: VIII

Name of the Course: **CH409** Project Engineering & Entrepreneurship Management

CO code	Course Outcome
CH409.1	Apply project life cycle various real life projects, various scientific aspects of project management,, role, responsibilities demands on project manager.
CH409.2	Analyze various types of feasibility reports, project selection criteria, project licensing, basic and detailed engineering, and various types of cost estimates, guarantees, liabilities and risk insurance.
CH409.3	Create WBSvarious clearances of a project, IPR, patents, LOI, project license, various forms of project, project team, and responsibilities of various members, selection criteria of project, contractor and consultant.
CH409.4	Plan project scheduling and its execution by CPM, PERT, GANTT chart, LOB, ABC and VED analysis, EOQ, CAT vs RAT.
CH409.5	Utilize project monitoring and control through time and cost control tools, fund flow control techniques and will have knowledge of project commissioning, start up and close out.
CH409.6	Analyze entrepreneurial aspects- concept characteristics and factors effecting entrepreneurship, classification and types of entrepreneurship based on business.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH409.1	1	2	2	--	1	--	--	--	1	1	3	1	1	2	2
CH409.2	1	2	2	--	1	--	--	--	1	2	3	1	1	2	2
CH409.3	1	2	2	--	1	--	--	--	3	3	3	1	1	2	2
CH409.4	2	2	2	--	1	--	--	--	1	1	3	1	1	2	2
CH409.5	1	2	2	--	1	--	--	--	1	1	3	1	1	2	2
CH409.6	1	2	2	--	1	--	--	--	3	1	3	1	1	2	2
CH409	1.17	2	2	--	1	--	--	--	1.67	1.5	3	1	1	2	2

Name of the Faculty: Ms. Prajakta Angre Class: B**E** Sem: **VIII**

Name of the Course: **CH410** Energy System Design

CO code	Course Outcome
CH410.1	Discuss global energy scenario.
CH410.2	Demonstrate energy audit.
CH410.3	Develop energy efficient technologies.
CH410.4	Design energy integration in process industries.
CH4104.5	Design heat integration in process units.
CH410.6	Demonstrate and implement the concept of cogeneration and waste heat recovery.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	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 1	PSO 2	PSO 3
CH410.1	3	3	3	1	1	1	2	-		1	-		3	1	2
CH410.2	3	3	3	1	1	1	2	-		1	-		3	2	2
CH410.3	3	3	3	1	1	1	2	-		1	-		3	2	2
CH410.4	3	3	3	1	1	1	2	-		1	-		3	2	2
CH410.5	3	3	3	1	3	1	2	-		1	-		3	2	2
CH410.6	3	3	2	1	3	1	2	-		1	-		3	2	2
CH410	3	3	2.83	1	1.67	1	2	-		1	-		3	1.83	2

Course outcome

Name of the Faculty: Prof. U.W. Khandalkar Class: **BE** Sem: VIII

Name of the Course: **CH411** Department Elective IV (Advanced Separation Technology)

CO code	Course Outcome
CH411.1	Explain the concept of separation by adsorption process
CH411.2	Apply the knowledge to design adsorption process for separation and purification.
CH411.3	Explain the foam fractionation process with equipments and application in waste water treatment.
CH411.4	Apply the knowledge of liquid chromatography process for separation - types and separation and of enzymes using it.
CH411.5	Apply the knowledge of membrane processes for separation
CH411.6	Explain the Characterization of membranes

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH411.1	2	1	1	1	1	--	--	--	--	--	--	--	1	1	2
CH411.2	2	2	2	1	1	--	1	--	--	--	--	--	2	2	1
CH411.3	1	2	2	--	2	--	1	--	--	--	--	--	2	2	1
CH411.4	1	1	3	1	1	--	1	--	--	--	--	--	1	1	2
CH411.5	2	1	2	1	2	--	--	--	--	--	--	--	2	2	1
CH411.6	2	1	2	--	1	--	--	--	--	--	--	--	1	2	2
CH411	1.66	1.33	2	1	1.33	--	1	--	--	--	--	--	1.5	1.66	1.5

Course outcome

Name of the Faculty: Dr. C.K. Mistry / Prof. Y.A. Karpe Class: **BE** Sem: **VIII**

Name of the Course: **CH412** (Modelling Simulation and Optimization Laboratory**)**

CO code	Course Outcome
CH412.1	Design and apply linear and non-linear mass and energy balance equations for individual as well as multiple units.
CH412.2	Analyze sequential and equation oriented simulation of complete flow sheets.
CH412.3	Evaluate and optimize typical chemical processes.
CH412.4	Demonstrate and analyze control of typical chemical processes.
CH412.5	Analyze sequential and equation oriented simulation of unit operations.
CH412.6	Identify and utilize various freeware simulation packages in chemical engineering.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH412.1	3	3	2	-	1	-	-	-	1	1	1	1	3	2	2
CH412.2	3	3	3	-	1	-	-	-	1	1	1	1	3	2	2
CH412.3	3	3	2	-	1	-	-	-	1	1	1	1	3	2	2
CH412.4	3	3	2	-	3	-	-	-	1	1	1	1	3	2	2
CH412.5	3	3	3	-	1	-	-	-	1	1	1	1	3	2	2
CH412.6	2	2	3	-	3	-	-	-	1	1	1	1	2	2	2
CH412	2.83	2.83	2.5	-	1.67	-	-	-	1	1	1	1	2.83	2	2

Name of the Faculty: Dr. N.S. Kolhe
Class: **BE** Sem: VIII
Name of the Course: **CH413** Project Engineering & Entrepreneurship Management (T)

CO code	Course Outcome
CH413.1	Apply project life cycle various real life projects, various scientific aspects of project management,, role, responsibilities demands on project manager.
CH413.2	Analyze various types of feasibility reports, project selection criteria, project licensing, basic and detailed engineering, and various types of cost estimates, guarantees, liabilities and risk insurance.
CH413.3	Create WBSvarious clearances of a project, IPR, patents, LOI, project license, various forms of project, project team, and responsibilities of various members, selection criteria of project, contractor and consultant.
CH413.4	Plan project scheduling and its execution by CPM, PERT, GANTT chart, LOB, ABC and VED analysis, EOQ, CAT vs RAT.
CH413.5	Utilize project monitoring and control through time and cost control tools, fund flow control techniques and will have knowledge of project commissioning, start up and close out.
CH413.6	Analyze entrepreneurial aspects- concept characteristics and factors effecting entrepreneurship, classification and types of entrepreneurship based on business.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PSO**	**PSO**	**PSO**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CH413.1	1	2	2	--	1	--	--	--	1	1	3	1	1	2	2
CH413.2	1	2	2	--	1	--	--	--	1	2	3	1	1	2	2
CH413.3	1	2	2	--	1	--	--	--	3	3	3	1	1	2	2
CH413.4	2	2	2	--	1	--	--	--	1	1	3	1	1	2	2
CH413.5	1	2	2	--	1	--	--	--	1	1	3	1	1	2	2
CH413.6	1	2	2	--	1	--	--	--	3	1	3	1	1	2	2
CH413	1.17	2	2	--	1	--	--	--	1.67	1.5	3	1	1	2	2

Course outcome

Name of the Faculty: Ms. Prajakta Angre Class: B**E** Sem:VIII

Name of the Course: **CH414** Energy System Design Tutorial

CO code	Course Outcome
CH414.1	Discuss global energy scenario.
CH414.2	Demonstrate energy audit.
CH414.3	Develop energy efficient technologies.
CH414.4	Design energy integration in process industries.
CH414.5	Design heat integration in process units.
CH414.6	Demonstrate and implement the concept of cogeneration and waste heat recovery.

CO-PO and CO-PSO Mapping

CO code	Program Outcomes (PO)												PSO		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CH414.1	3	3	3	1	1	1	2	-	1		-		3	1	2
CH414.2	3	3	3	1	1	1	2	-	1		-		3	2	2
CH414.3	3	3	3	1	1	1	2	-	1		-		3	2	2
CH414.4	3	3	3	1	1	1	2	-	1		-		3	2	2
CH414.5	3	3	3	1	3	1	2	-	1		-		3	2	2
CH414.6	3	3	2	1	3	1	2	-	1		-		3	2	2
CH414	3	3	2.83	1	1.67	1	2	-	1		-		3	1.83	2