PPSU

P P SAVANI UNIVERSITY

SCHOOL OF ENGINEERING

DIPLOMA

CHEMICAL ENGINEERING

SYLLABUS BOOK

AY 2023-24

INSTITUTE VISION
To emerge as an Institute of Excellence by imparting value-based education aided with Research, Innovation and Entrepreneurial skills.

INSTITUTE MISSION	
1.	To impart the holistic engineering education of highest quality & prepare socially responsible professionals with entrepreneurial skills.
2.	To prepare value-aided engineering professionals to meet up global industry requirements by imparting cutting edge professional education.
3.	To inculcate the attitude of research and innovation among the stake holders through experiential and project-based teaching-learning pedagogy.
4.	To acquire global talent pool by providing world class amenities for teaching, learning & research.

Graduates will demonstrate ability to:

PEO No	PROGRAMME EDUCATIONAL OBJECTIVES
PEO 1	Solve real-world engineering problems, design and develop innovative and cost-effective solutions exhibiting engineering skills/fundamentals to cater needs of society.
PEO 2	Excel in Industry/technical profession, higher studies, and entrepreneurship exhibiting comprehensive competitiveness.
PEO 3	Exhibit professional ethics & values, effective communication, teamwork, multidisciplinary approach, and ability to relate engineering issues to broader societal framework.

PO No	PROGRAMME OUTCOMES
PO 1	Engineering knowledge: Apply knowledge of engineering fundamentals, science, mathematics & engineering specialization for the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate and analyze complex engineering problems leading to substantial conclusions using basic principles of mathematics, science and engineering.
PO 3	Design/development of solutions: Develop solutions for complex engineering problems and design system components or processes meeting specified needs having due consideration for the safety and societal & environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge & methods like design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid & viable conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools for prediction and modeling of complex engineering activities with an understanding of the limitations.
PO 6	The engineer and society: Apply cognitive learning by the contextual knowledge to assess societal, health, safety, legal and cultural issues and following responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge & skill needed for sustainable development.
PO 8	Values & Ethics: Apply basic moral values & ethical principles and pledge to professional ethics/norms and responsibilities of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual/as a team member or as a leader in diverse teams, and in multidisciplinary settings.
PO 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.
PO 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 in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need, do necessary preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PSO No	PROGRAMME SPECIFIC OUTCOMES (PSO) CHEMICAL ENGINEERING
PSO 1	Develop expertise in utilizing contemporary tools and technologies in cybersecurity to identify, analyze and mitigate threats, ensuring data integrity, confidentiality and availability of digital assets and systems.
PSO 2	Design and implement secure information systems and policies, applying principles of cryptography, network security, and risk management to solve real-world cybersecurity challenges and enhance the security posture across various sectors.
PSO 3	Prepare technically competent employee, researcher, entrepreneur, and excel in competitive exams, and increase passion for higher studies.

Credit Guidelines (General)			
Component	**Hour/Week**	**Credit**	**Total Hours/Semester**
Theory	1	1	15
Practical	2	1	30
Tutorial	1	1	15
Note: In specific cases; extra credits can be granted for specific/important subjects.			

CO-PO Mapping Guidelines		
Mapping Level	**% age Mapping**	**Indicator**
0 / -	0	No Mapping
1	0-33	Low Level (Slightly Mapped)
2	33-66	Medium Level (Moderately Mapped)
3	>66	High Level (Strongly Mapped)

Syllabus Book

Diploma Engineering (Chemical Engineering)

P P Savani University

Institute of Diploma Studies

Effective From: 2023-24

Authored by: P P Savani University

CONTENT

FIRST YEAR
DIPLOMA ENGINEERING

P P SAVANI UNIVERSITY															
INSTITUTE OF DIPLOMA STUDIES															
TEACHING & EXAMINATION SCHEME FOR DIPLOMA ENGINEERING PROGRAMME AY:2023-24															
Sem.	**Course Code**	**Course Title**	**Offered By**	**Teaching Scheme**					**Examination Scheme**						
				Contact Hours				**Credit**	**Theory**		**Practical**		**Tutorial**		**Total**
				Theory	**Practical**	**Tutorial**	**Total**		**CE**	**ESE**	**CE**	**ESE**	**CE**	**ESE**	
1	IDSH1010	Fundamentals of Mathematics	SH	3	0	2	**5**	5	40	60	0	0	50	0	**150**
	IDSH1020	Engineering Physics	SH	3	2	0	**5**	4	40	60	20	30	0	0	**150**
	IDME1010	Basics of Mechanical & Civil Engineering	ME	2	4	0	**6**	4	40	60	40	60	0	0	**200**
	IDCE1010	Computer Applications	CE	3	4	0	**7**	5	40	60	40	60	0	0	**200**
	IDME1020	Engineering Workshop	ME	0	2	0	**2**	1	0	0	50	0	0	0	**50**
	CFLS1030	Functional English-I	CFLS	2	0	0	**2**	2	40	60	0	0	0	0	**100**
						Total	**27**	**21**							**850**
2	IDSH1040	Engineering Mathematics	SH	3	0	2	**5**	5	40	60	0	0	50	0	**150**
	IDSH1050	Fundamentals of Chemistry	SH	3	2	0	**5**	4	40	60	20	30	0	0	**150**
	IDCV1010	Engineering Mechanics	CV	3	2	0	**5**	4	40	60	20	30	0	0	**150**
	IDIT1010	Introduction to Computer Programming	IT	3	4	0	**7**	5	40	60	40	60	0	0	**200**
	IDSH1060	Electrical &Electronics Workshop	SH	0	2	0	**2**	1	0	0	50	0	0	0	**50**
	CFLS1040	Functional English-II	CFLS	2	0	0	**2**	2	40	60	0	0	0	0	**100**
						Total	**26**	**21**							**800**

P P Savani University
Institute of Diploma Studies

Department of Applied Science & Humanities

Course Code: IDSH1010
Course Name: Fundamentals of Mathematics
Prerequisite Course(s): Algebra, Geometry, Trigonometry till 9th Standard level

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	0	2	5	40	60	-	-	50	0	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the course:
To help learners to

- outlining logarithm properties.
- implementing concepts of Determinants and Matrices for solving science and engineering problems.
- presenting usefulness of trigonometry.
- acquire knowledge of co-ordinate geometry and ability to work with applications to Engineering Mathematics.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Logarithm** Basic concept of logarithm, Rules and related examples, Applications of logarithm.	5	14
2.	**Determinants and Matrices** Basic concept of determinants and matrices, Addition and subtraction, Product, Inverse up to 3X3 matrix, Solution of simultaneous equations up to three variables, Applications of determinants and matrices.	9	18
3.	**Trigonometry** Basic concept of trigonometry, Units of angles (degree and radian), Allied & compound angles, Multiple–submultiples angles, Graph of sine and cosine, Periodic function, Sum and factor formulae, Inverse trigonometric function, Applications of trigonometry.	9	18
Section II			
4.	**Co-ordinate geometry** Introduction, Point, Distance formula, Mid-point, Locus of a point, Straight lines, Slope of a line, Equation of a straight line, The general equation, Angle between two lines, Circle, Tangent and normal, Equation of tangent and normal.	6	15
5.	**Vectors**	8	15

	Basic concept of vector and scalar, Addition and subtraction, Product of vectors, Geometric meaning of scalar and vector product, Angle between two vectors, Applications of dot and cross product, Work done and moment of force.		
6.	**Mensuration** Basic concept of Mensuration, Area of Triangle, Square, Rectangle, Trapezium, Parallelogram, Rhombus and Circle surface, Volume of Cuboids, Cone, Cylinder and Sphere.	8	20

List of Tutorials:

Sr. No.	List of Tutorial	Hours
1.	Logarithm-1	2
2.	Logarithm-2	2
3.	Determinants and Matrices-1	2
4.	Determinants and Matrices-2	2
5.	Determinants and Matrices-3	2
6.	Trigonometry-1	2
7.	Trigonometry-2	2
8.	Trigonometry-3	2
9.	Co-ordinate geometry-1	2
10.	Co-ordinate geometry-2	2
11.	Vectors-1	2
12.	Vectors-2	2
13.	Mensuration-1	2
14.	Mensuration-2	2
15.	Mensuration-3	2

Text Book:

Title	Author(s)	Publication
Advanced Mathematics for Polytechnic	Dr.N.R. Pandya	Macmillan Publication
Engineering Mathematics - 3rd Edition	Anthony croft &others	Pearson Education Publication

Reference Book:

Title	Author(s)	Publication
Basic Mathematics	G.C. Patel and Ami C. Shah	Atul Prakashan
Applied Mathematics for Polytechnics - 10th Edition	H. K. Dass	H. K. Dass
Applied Mathematics	W. R.Neelkanth	Sapna Publication

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.

- End Semester Examination consists of 60 marks.

Tutorial:

- Continuous evaluation consists of performance of tutorial which will be evaluated out of 10 Marks for each tutorial and average of the same will be converted to 30 marks.
- MCQ based examination consists of 20 marks.

Course Outcome(s):

After the completion of the course, students will be able to:

CO1	Explain logarithmic properties and solve exponential expressions.
CO2	Demonstrate the ability to crack engineering related problems based on determent and matrices.
CO3	Define properties of trigonometry and vectors in contruction.
CO4	Establish the knowledge of coordinate geometry, and ability to solve engineering problems.
CO5	Explain the surface area and volume of different shapes and bodies.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Logarithm	1,2,3,5
2	Determinants and Matrices	2,3,4,5
3	Trigonometry	2,3,4,5,6
4	Coordinate geometry	2,3,5
5	Vectors	2,3,5
6	Mensuration	1,2,3,5

P P Savani University

Institute of Diploma Studies

Department of Applied Science & Humanities

Course Code: IDSH1020

Course Name: Engineering Physics

Prerequisite Course(s): Concept of Science up to 9th Standard

Teaching & Examination Scheme

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	2	0	4	40	60	20	30	0	0	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the course:

- The student will demonstrate the ability to think in core concept of their engineering application by studying various topics involved in branch specific applications.
- The student will demonstrate the ability to use appropriate mathematical techniques and concepts to obtain quantitative solutions to problems in physics.
- In courses involving laboratory, the student will demonstrate the ability to collect and analyze data and to prepare coherent reports of his or her findings.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**SI Units & Measurements:** Need of measurement and unit in engineering and science, Definition of unit and requirements of standard unit, Systems of units- CGS, MKS and SI, Fundamental and Derived quantities and their units, Least count and range of instrument, Vernier caliper, Micrometer screw gauge, Accuracy, Precision, Error and types of error, Estimation of errors - Absolute error, Relative error and Percentage error, Rules and identification of significant figures	5	10
2.	**Motion in a Plane:** Scalar and vector quantities, Position and displacement vectors, General vectors and their notations, Equality of vectors, multiplication of vectors by a real number, Addition and subtraction of vectors, Relative velocity, Unit vector, Resolution of a vector in a plane - rectangular components, Scalar and Vector product of vectors, Motion in a plane, Cases of uniform velocity and uniform acceleration-projectile motion, Uniform circular motion	6	15
3.	**Force and Motion:** Recapitulation of equations of motion, Newton's 1st law of motion, Force, basic forces in motion, Gravitational force, Electrostatic force, Electromagnetic force, Nuclear force, Inertia, types of inertia,	6	15

	Momentum and Newton's 2nd law of motion, Impulse of force, Impulse as the product of force and time, impulse as the difference of momentum, Newton's 3rd law of motion and its examples, Law of conservation of momentum		
4.	**Work, Energy and Power:** Work done by a constant force and a variable force, Kinetic energy, Work-energy theorem, Power, Notion of potential energy, Potential energy of a spring, Conservative forces, Conservation of mechanical energy (kinetic and potential energies), Non-conservative forces, Motion in a vertical circle, Elastic and inelastic collisions in one and two dimensions	5	10
	Section II		
5.	**Mechanical Properties of Solids and fluids:** Deforming force, Restoring force, Elastic and plastic body, Stress and Strain with their types, Elastic limit, Hooke's law, Young's modulus, Bulk modulus, Modulus of rigidity and Relation between them (no derivation), Stress- Strain diagram, Yield point, Ultimate stress, Breaking stress, Factor of safety. Pascal's law and its applications (hydraulic lift and hydraulic brakes), Effect of gravity on fluid pressure, Viscosity, Stokes' law, terminal velocity, streamline and turbulent flow, critical velocity, Bernoulli's theorem and its applications, Surface energy and surface tension, angle of contact	8	20
6.	**Heat Transfer:** Introduction to thermodynamics, Temperature and Heat, Transmission of heat - Conduction, Convection and Radiation, Good and bad conductor of heat with examples, Law of thermal conductivity, Coefficient of thermal conductivity and its S.I. unit Heat capacity and Specific heat of materials, Celsius, Fahrenheit and Kelvin temperature scales and their conversion formula	5	10
7.	**Oscillations:** Periodic motion - time period, frequency, displacement as a function of time, Periodic functions, Simple harmonic motion (S.H.M) and its equation, Phase Oscillations of a spring-restoring force and force constant, Energy in S.H.M. Kinetic and potential energies, Simple pendulum derivation of expression for its time period, Free, forced and damped oscillations (qualitative ideas only), resonance	5	10
8.	**Waves:** Wave motion, Transverse and longitudinal waves, Speed of wave motion, Displacement relation for a progressive wave, Principle of superposition of waves, Reflection of waves, Sanding waves in strings and organ pipes, Fundamental mode and harmonics, Beats, Doppler effect	5	10

List of Practical:

Sr. No.	List of Practical	Hours
1.	To study about basic unit conversion and dimension analysis.	4
2.	To measure length and diameter of the given object using Vernier callipers.	2
3.	To measure the thickness of slit and diameter of wire with help of micrometer Screw Gauge.	2
4.	To determine the surface tension of water by capillary rise method.	4
5.	To Verify Ohm's Law by using an Ammeter & Voltmeter	2
6.	To determine the wavelength of sound produced (i) in an air column and the velocity of sound in air at room temperature using a resonance column and a tuning fork.	4
7.	To determine Young's modulus of a material of a beam by the method of bending of a beam.	4
8.	To determine the modulus of rigidity of the material of wire by dynamical method.	2
9.	To determine the value of 'g' by using a Simple Pendulum.	2
10.	Measurement of g: Use of a Kater's Pendulum.	2
11.	To measure the temperature of given material by any temperature measuring instrument.	2

Text Book:

Title	Author(s)	Publication
Basic physics for Diploma group -1	-	Atul Prakashan

Reference Books:

Title	Author(s)	Publication
Physics Part-I and II	Resnick and Haliday	Wiley EasternPublication
Concept of Modern Physics	Arthur Beiser	Tata McGrawHill
Concept of Physics	H CVerma	-
Fundamental of physics	Gomber & Gogia	Pradeep publicationsJalandhar
NCERT Physics part 1 & 2	-	NCERT

Course Evaluation:

Theory:

- Continuous Evaluation Consist of Two Test Each of 30 Marks and 1 Hour of duration.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination will consist of 60 Marks Exam.

Practical:

- Continuous Evaluation Consist of Performance of Practical which should be evaluated out of 10 for each practical in the next turn and average of the same will be converted to 10 Marks.
- Internal Viva component of 10 Marks.
- Practical performance/quiz/drawing/test of 20 Marks during End Semester Exam.
- Viva/Oral performance of 10 Marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, students will be able to:

CO 1	Identify physical quantities, unit systems and estimate measurements with accuracy by minimizing errors to solve real life measurements.
CO 2	Classify different types of motion, interpreat the equation of motion and conservation law of momentum to describe motion of rocket, recoil of gun etc. derive relationships for work, energy and power and solve related problems.
CO 3	Understand the concept of elasticity, it's types and articulate in engineering applications, especially in civil engineering. the knowledge is extended to explore the properties of fluids, construct the concepts of viscosity and surface tension.
CO 4	Explain the basics of heat transfer and employ the knowledge of heat and thermodynamics in different engineering sectors especially mechanical and chemical.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
01	Introductory Concepts	3,5
02	Mechanics	1,4
03	Work, Energy and Power	1,3
04	Mechanical properties of solids	2,6
05	Properties of fluids	1,5
06	Heat transfer	3,4

P P Savani University
Institute of Diploma Studies
Department of Mechanical Engineering

Course Code: IDME1010
Course Name: Basics of Mechanical and Civil Engineering
Prerequisite Course(s): -

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	04	00	04	40	60	40	60	00	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- acquire an inclusive knowledge of fundamental concept of Mechanical Engineering.
- understand working of simple mechanical devices.
- study and gain significance of Mechanical Engineering in various fields.
- read and interpret the building drawing
- select different types of construction materials as per requirements

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction of Mechanical Engineering:** Introduction, Scope, Importance, Basic terminologies in mechanical engineering, Basic mechanical components used in routine, Pipe and pipe fittings, Hand tools, Power tools	02	7
2.	**Heat interactive equipment:** Heat transfer and its Modes, Boilers, Classification and Working, Concept of Accessories and Mountings – Types, Applications, Primemovers, Meaning, Classification, Steam turbine working, Layout of thermal power plant, Working and applications, Internal combustion engines – Definition, Classification, Components, Working of two-stroke and four-stroke engines, S.I. and C.I. engines	04	13
3.	**Power Transmission and Safety:** Power transmission: Importance, Modes, Types, Applications, Couplings in power transmission, Safety norms to be followed for preventing accidents.	03	10
4.	**Hydraulic and pneumatic devices:** Concept of theory of fluid flow, general properties of fluid flow, Pumps,	03	10

	Water turbines, and Air compressors – working principle, types, parts, performance, troubles and remedies, applications.		
5.	**Manufacturing processes:** Overview of manufacturing processes, Welding concept and overview, Types, Arc and Gas welding, Accessories and Consumables, Precautions and Safety during arc and gas welding, Casting - Introduction, Applications.	03	10
Section II			
6.	**Civil Engineering: An Overview** Introduction, Branches, Scope, Impact, Role of Civil Engineer, Unit of measurement, Unit conversion (Length, Area, Volume).	02	7
7.	**Civil Engineering Surveying:** Surveying & leveling (its importance and types), Necessity for leveling, Principals of surveying, Instrument/tools used for survey and level, Various methods of finding the field survey measurements, Chain and Compass Survey	05	17
8.	**Civil Engineering Drawing**: Types of building drawings, Abbreviation, conventions & symbols in civil drawing, building byelaws for planning of residential building and industrial building, Planning of simple residential and industrial building	04	13
9.	**Construction Materials**: Common construction materials such as cement, Brick, Stone, Timber, Steel and Concrete, Properties of each materials & their acceptable standards, Quality parameters of materials, Estimations and costing for simple structure (only the material cost)	04	13

List of Practical:

Sr. No.	Details of Practical	Hours
1.	Study of few selected boilers, accessories and mountings	02
2.	Numerical based on heat interactive equipment	02
3.	Study of power and motion transmission systems	04
4.	Numerical based on power transmission and safety	02
5.	Study of various pumps	04
6.	Numerical based on hydraulic and pneumatic devices	02
7.	Study and demonstration of basic machine tools	04
8.	Numerical based on manufacturing processes	02
9.	Machine parameters of wheel and differential axel apparatus	04
10.	Study and demonstration of basic mechanical equipment	04
11.	Unit Conversation Exercise	02
12.	Linear Measurement.	04
13.	Angular Measurement (Prismatic Compass)	04
14.	Angular Measurement (Surveyor Compass)	04
15.	Determine R.L of given point by Dumpy level without change point.	04
16.	Determine R.L of given point by Dumpy level with change point.	04
17.	Brick masonry bonds	04

18.	Aggregate experiments	02
19.	Brick masonry tests	02

Reference Book(s):

Title	Author/s	Publication
Elements of Mechanical engineering	P. S. Desai and S. B. Soni	Atul Prakashan
Theory of Machines	R. S. Khurmi and J. K. Gupta	S. Chand
Heat engine	Shah and Pandya	Charotar Publishing House
Hydraulic machines	Jagdish Lal	Metropolitan Book Company
Elements of Workshop	Hazara Chaudhary	Asia Publishing House
Text book on Surveying& Levelling	S. B. Junnarkar and H. J. Shah	Laxmi Publication

Course Evaluation:

Theory:

- Continuous Evaluation Consist of Two Test Each of 30 Marks and 1 Hour of duration.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination will consist of 60 Marks Exam.

Practical:

- Continuous Evaluation Consist of Performance of Practical which should be evaluated out of 10 for each practical in the next turn and average of the same will be converted to 10 Marks.
- Internal Viva component of 10 Marks.
- Practical performance/quiz/drawing/test of 20 Marks during End Semester Exam.
- Viva/Oral performance of 10 Marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, students will be able to:

CO 1	Undertsand the mechanical engineering background.
CO 2	Discover heat transfer in context with engines and boilers.
CO 3	Differentiate power transmission working.
CO 4	Identify the scope of civil engineering based on field experience.
CO 5	Illustrate mesurements of surveying & levelling & building components.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction to Mechanical Engineering	1,2
2	Heat Interactive equipment	2,4
3	Power Transmission and Safety	1,2,3
4	Hydraulic and pneumatic devices	2,4
5	Manufacturing Processes	2,4,6
6	Civil Engineering: An Overview	1,2
7	Civil Engineering Drawing	2,4
8	Construction Materials	2,4,5

P P Savani University

Institute of Diploma Studies

Department of Chemical Engineering

Course Code: IDCE1010
Course Name: Computer Applications
Prerequisite Course (s):--

Teaching & Examination Scheme:

Teaching Scheme(Hours/Week)				Examination Scheme(Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	04	00	05	40	60	40	60	00	00	200

CE: Continuous Evaluation, ESE :End Semester Exam

Objective(s) of the Course:

To help learners to

- Familiarize with components of computer and basic operations of it.
- Provide practical and hands-on experience of application used to create documents.
- Introduce internet and its usage.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in%
1.	**Basics of Computer System** Introduction and Characteristics, Generation, Classification, Applications, describe computer hardware and software, Identify I/O, Devices, describe functioning of CU, ALU and memory unit, differentiate various types of printers, Demonstrate various file handling operations, Introduction to Memory, Memory hierarchy, Primary memory and its type, Secondary memory, Classification of Secondary memory, Cache Memory and Virtual Memory.	08	20
2.	**Computer Software** Software concept Classification of Software, System software and Application Software, Overview of Operating System, Objectives and Functions of O.S, Types of Operating System, Batch Processing, Multiprogramming, Time Sharing OS, Features of DOS, Windows and UNIX, Programming Languages, Compiler, Interpreter, Computer Virus Different Types of computer virus, Detection and prevention of Virus Application of computers in different Domain. Installation of device drivers and other required software, need and method of backup.	08	15
3.	**Using MS-Word** Use basics text formatting features, manipulate text, use page	07	15

	Setup features, use spell and grammar utility, Work with graphics/ clipart, Create and manipulate table, use auto shapes and its formatting with text, Use Image and table formatting.		
Section II			
4.	**Using MS-Excel** Use basic formatting and data entry features, use formula and functions, Work with graphics, Create and manipulate charts, Use header and footer options, Setup page layout and print worksheet	07	20
5.	**Using MS - PowerPoint** Create new presentation and apply basic formatting features, use master slide, Create and manipulate table, Work with objects and clips, Work with video, Work with audio, use special effects, Use navigation and hyper linking, Custom Animation and Transitions	07	15
6.	**Multi Media, Internet usage and Google Applications** Introduction of Multimedia, Types of Multimedia, and Use of Multimedia in various platforms, Describe Internet, WWW and Web Browsers: Web Browsing software, Surfing the Internet, Chatting on Internet, Basic of electronic mail, Using Emails, Document handling, Network definition, Common terminologies: LAN, WAN, Node, Host, Workstation, bandwidth, Network Components: Severs, Clients, Communication Media. Introduction of Google Applications, Gmail, Google Drive, Docs, Spreadsheet	08	15

List of Practical(s):

Sr.No	List of Practical	Hours
1.	Introduction to different hardware components of PC and Assembling of PC.	02
2.	Installation of OS and other Software. Partitions of Drive, Compression Utilities: WinZip, Defragmenting Hard, Formatting Hard disk, etc.	04
3.	Use accessories utilities of windows OS the User Interface, Using Mouse and Moving Icons on the screen, The My Computer Icon, The Recycle Bin, Status Bar, Start and Menu & Menu-selection, Running an Application, Windows Explorer Viewing of File, Folders and Directories, Creating and Renaming of files and folders, Opening and closing of different Windows, Control Panels, Setting the date and Sound, Create Users and password.	02
4.	Entering and editing text in document file. Apply formatting features on Text like Bold, Italics, Underline, font type, color and size, Apply features like bullet, numbering in Microsoft word.	04
5.	Create and manipulate tables, create documents, insert images, format tables, Smart art, Chart in Microsoft word, Insert Hyperlink, Page number and textbox in word.	04
6.	Create Event Registration Form and Resume in Microsoft word.	04
7.	Entering and editing data in worksheet, Fill Series, fill with formatting and without formatting Using Microsoft Excel.	02
8.	Create and manipulate Charts, Shape, Sparkline Charts, Clipart, and table.	04
9.	Filter Data Using Filter and advanced filter function with more than 2 conditions,	02

	Freeze row & Column in Microsoft Excel.	
10.	Create Mark sheet, and Pay slips using Excel, Apply various formula and functions in the sheet.	06
11.	Print sheet using print area, Page setting, print titles, Adjusting margins, Page break, headers and footers.	02
12.	Basic operations of Power point, Create PPT and inset and delete slides in power point, Use of Master Slide in Presentation, Create Project presentations, Lecture presentations, Apply Custom animation & Transition. Apply basic formatting features in presentation like font, font size, font color, text fill, spacing and line spacing Formatting text boxes, word arts, styles bullet and numbering in Microsoft power point. Working with drawing tools, applying shape or picture styles, Applying object borders, object fill, object effects in Microsoft Power point.	16
13.	Working with video, Link to video and sound files using power point.	02
14.	Internet Searching, Browsers, Various functions of Browsers (Eg. Bookmark, Customize Settings), Study of components like switches, bridges, routers, Wi-Fi router,	02
15.	Introduction of Google application, Compose Gmail, File attachment, add signature.	02
16.	Demonstration of Google drive, Sharing File Using Google drive, Spreadsheet, Docs and Google slides	02

Reference Book(s):

Title	Author/s	Publication
Computer Course	R.Taxali	Tata McGraw Hills. New Delhi.
MS-Office for Dummies	Wallace Wang	Wiley India, New Delhi
Basic Computer Engineering	Petes S.J.,Francis.	TataMcGraw-Hill Education,2011

Web Material Link(s):

- http://www.digimat.in/nptel/courses/video/106104128/L01.html
- https://www.youtube.com/watch?v=3QiItmIWmOM

Course Evaluation:

Theory

- Continuous Evaluation Consist of two Tests of 30 Marks and 1 Hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination will consist of 60 Marks Exam.

Practical

- Continuous Evaluation Consist of Performance of Practical which should be evaluated out of 10 for each practical in the next turn and average of the same will be converted to 20 Marks.
- Internal Viva component of 20 Marks.
- Practical performance/quiz/test of 30 Marks during End Semester Exam.
- Viva/Oral performance of 30 Marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, students will be able to:

CO 1	Identify the components of a computer system and demonstrate basic proficiency in commonly used applications.
CO 2	Analyze, synthesize and evaluate school, work or home situations and use application software to complete information processing tasks efficiently and effectively.
CO 3	Apply the concepts of microsoft office – word, excel, and power point to produce professional documentation and presentation.
CO 4	Access the internet and learn to use the browse, search and hyperlink capabilities of web browsers.
CO 5	Identify the significance of multimedia and its utilization in various platforms.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Basics of Computer system	1,2
2	Computer Software	1,2
3	Using MS-Word	2,3
4	Using MS-Excel	2,3,4
5	Using MS-Powerpoint	2,3
6	Multi Media, Internet Usage and Google Applications	2,3,5

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME1020
Course Name: Engineering Workshop
Prerequisite Course(s): -

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
00	02	00	01	00	00	50	00	00	00	50

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- Understand basic know-how of various hand tools and their use in different sections of manufacturing
- Understand the use of workshop practices in day to day industrial as well domestic life that help to dissolve the routine problems
- Build the understanding of the complexity of the industrial job, along with time and skills requirements of the job
- Learn about the safety measures to be taken while working in workshop.
- Learn about operation wise tool selection.

Course Content:

Section I		
Module No.	Content	Hours
1.	**Introduction and Demonstration of Safety Norms and various shops:** Introduction to various shops / sections and workshop layouts, Safety norms to be followed in a workshop.	-
2.	**Fitting shop:** Introduction of fitting shop, Safety, Making a job as per drawing including marking and performing other operations	-
3.	**Carpentry shop:** Introduction of carpentry shop, Safety, Making a job as per drawing including marking and performing other operations	-
4.	**Smithy shop:** Introduction of smithy shop, Safety, Making a job as per drawing including marking and performing other operations	-

Section II		
5.	**Sheet metal shop:** Introduction of sheet metal shop, Safety, Making a job as per drawing including marking and performing other operations	
6.	**Pipe fitting:** Introduction of pipe fitting shop, Safety, understanding various pipe fitting tools and performing operations	-
7.	**Machine Shop:** Introduction and demonstration of various machines likeLathe, Drilling, Grinding, Hack Saw Cutting etc.	-

List of Practical:

Sr. No.	List of Practical	Hours
1.	Introduction and Demonstration of Safety Norms and various shops.	02
2.	To Perform a Job of Fitting Shop.	04
3.	To Perform a Job of Carpentry Shop.	06
4.	To Perform a Job of Black Smithy shop.	06
5.	To Perform a Job of Sheet metal Shop.	04
6.	To Perform a Job of Plumbing Shop	04
7.	Introduction to Machine Tool	04

Reference Book(s):

Title	Author/s	Publication
Workshop Technology-I	Hazra and Chaudhary	Media promoters & Publisher private limited.
Workshop practice manual	K.Venkata Reddy	B.S.Publications
Mechanical workshop practice	K.C. John	PHI

Course Evaluation:

Practical:

- Continuous Evaluation Consist of Performance of Practical which should be evaluated out of 10 for each practical in the next turn and average of the same will be converted to 20 Marks.
- Internal Viva component of 20 Marks.
- Practical performance/quiz/test of 30 Marks during End Semester Exam.
- Viva/Oral performance of 30 Marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, students will be able to:

CO 1	Understand the various measuring instruments.
CO 2	Understand the safety norms required in the workshop.
CO 3	Understand the application of various tools required for different operations.
CO 4	Remember the process of manufacture from a given raw material.
CO 5	Explain various manufacturing processes in machine shop.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction and Demonstration of Safety Norms and Various Shops	2,4
2	Fitting Shop	2,4,6
3	Carpentry Shop	2,4,6
4	Smithy Shop	2,4,6
5	Sheet metal shop	2,3,4
6	Pipe fittings	2,3,5
7	Machine Shop	2,3,4

P P Savani University
Centre for Language Studies

Course Code: CFLS1030
Course Name: Functional English-I
Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	00	00	02	40	60	00	00	--	--	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- hone English Grammar to use language effectively in everyday life.
- use tenses to
- build vocabulary.
- understand and use Sentence formation and types.
- use comparative degree to express comparison.
- create sentence in active-passive voice.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Parts of Speech – I** • Types of Nouns • Verb • Pronoun (personal, possessive) • Adverbs • Adjectives	05	12
2.	**Parts of Speech – II** • Use of Prepositions of time and place • Conjunctions • Interjections • Articles 'A, An, and The' • Indicators- this, that, these, those	05	13
3.	**Tenses** • Present and past simple form of 'to be' – am/is/are/was/were • Present Tense (all forms) • Past Tense (all forms) • Future Tense (all forms)	06	25

Section II			
1.	**Vocabulary** • Basic Vocabulary • Academic Vocabulary • Jargons	03	12
2.	**Auxiliary Verb** • So, neither-nor, either-or • Shall, should, can, could, may, might, must	03	13
3.	**Types of Sentences** • Simple, Compound, and Complex sentences • Practice of Assertive, Negative, Interrogative, Exclamatory Sentences • Question Tag • 'WH' Questions • 'How much' & 'How Many' • Reported Speech • Active-Passive voice	08	25

Text Book (s):

Title	Author/s	Publication
High School English Grammar & Composition	Wren & Martin	Blackie ELT Books (An imprint of S. Chand Publishing)

Reference Book (s):

Title	Author	Publication
Intermediate English Grammar (Second Edition)	Raymond Murphy	Cambridge University Press
Advanced English Grammar	Martin Hewings	Cambridge University Press

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 25 marks.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After the completion of the course, students will be able to:

CO 1	Identify and use parts of speech effectively to express them.
CO 2	Understand familiar words related to everyday communication.
CO 3	Use English grammar to communicate effectively.
CO 4	Utilize tenses in real-world communication.
CO 5	Apply various vocabularies to express thoughts.
CO 6	Express comparison effectively.
CO 7	Use active-passive voice and reported speech.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Grammar & Vocabulary	1,3
2	Listening	2,4,5
3	Speaking	3,6
4	Reading	2,4,5
5	Writing	3,6

P P Savani University
Institute of Diploma Studies

Course Code: IDSH1040
Course Name: Engineering Mathematics
Prerequisite Course(s): Algebra, Geometry, Trigonometry till 9th Standard level

Teaching & Examination Scheme:

Teaching Scheme(Hours/Week)				Examination Scheme(Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	0	2	5	40	60	-	-	50	0	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s)of the course:
To help learners to

- Givea comprehensive coverage at an introductory level to the subject of Functions and Limits, Differentiation, Integration and First Order Differential Equations.
- Recognize importance of differentiation and integration for solving engineering problems.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in%
1.	**Function sand Limits** Introduction, Function, Types of function, Classification of function, Limit of a function, Properties of limit, Standard limits, limit of trigonometric functions.	5	14
2.	**Differentiation** Introduction, Differentiation, Geometric meaning, Derivative using first principle, Derivative of standard functions, Working rules, Differentiation of composite function, Differentiation of parametric functions, Differentiation of implicit function, Derivative using logarithms, Successive differentiation, Applications of differentiation (Velocity, Acceleration, Maxima & Minima simple problems).	9	18
3.	**Integration** Introduction, Integration of standard functions, Integration by substitution, Integration by parts, Integration using partial fraction, Definite integrals, Theorem on definite integrals, Applications of Integration (Area and Volume simple problems).	9	18
Section II			
4.	**Differential Equations of First order and First degree**	9	18

	Introduction, Formation of differential equations, Solution of differential equations, Separation of variables, Homogeneous equations, Exact Differential Equations, Integrating factor method, Linear differential equation.		
5.	**Complex Number** Introduction, Mathematical Operations, Polar form, Modulus, Amplitude Farm, De Movire's Theorem.	6	18
6.	**Statistics** Introduction, Central tendency, Mean, Mean of discrete observations, Mean of grouped data, Step deviation method, Median, Median for grouped data, Mode, Standard deviation, Standard deviation for Grouped data.	7	14

List of Tutorials:

Sr.No.	ListofTutorial	Hours
1.	FunctionsandLimits-1	2
2.	FunctionsandLimits-2	2
3.	Differentiation-1	2
4.	Differentiation-2	2
5.	Differentiation-3	2
6.	Integration-1	2
7.	Integration-2	2
8.	Integration-3	2
9.	Differential Equations of First order and Firstdegree-1	2
10.	Differential Equations of First order and Firstdegree-2	2
11.	Complex Number-1	2
12.	Complex Number-2	2
13.	Complex Number-3	2
14.	Statistics-1	2
15.	Statistics-2	2

Text Book:

Title	Author(s)	Publication
Advanced Mathematics for Polytechnic	Dr. N. R. Pandya	Macmillan Publication
Engineering Mathematics-3rdEdition	Anthonycroft & others	Pearson Education Publication

Reference Book:

Title	Author(s)	Publication
Applied Mathematics for Polytechnics-10th Edition	H.K.Dass	H.K.Dass
Applied Mathematics	W.R.Neelkanth	SapnaPublication
Polytechnic Mathematics	DeshpandeSP	PuneVidyarthiGruh Prakashan,1984
Polytechnic Mathematics	PrakashD S	SChand,1985

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to30marks.
- Faculty evaluation consists of 10 marks as per the guide lines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

Tutorial:

- Continuous evaluation consists of performance of tutorial which will be evaluated out of 10 Marks for each tutorial and average of the same will be converted to 30 marks.
- MCQ based examination consists of 20 marks.

Course Outcome(s):

After the completion of the course, students will be able to:

CO1	Apply differentiation and integration for solving engineering problems.
CO2	Implementing statistical methods for solving real world problems.
CO3	Develop the ability to apply differentiation to significant applied problems.
CO4	Estimate the limiting value of algebraic and trigonometric functions.
CO5	Represent complex numbers algebraically and geometrically for solving engineering related problems.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Functions and Limits	1,2,3,4
2	Differentiation	2,3,5
3	Integration	2,3,5
4	Differential Equations of First order and First degree	1,2,3,5
5	Complex Number	1,2,3,4,6
6	Statistics	1,2,3,4,5

P P Savani University
Institute of Diploma Studies
Department of Chemical Engineering

Course Code: IDSH1050
Course Name: Fundamentals of Chemistry
Prerequisite Course(s): --

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	2	0	4	40	60	20	30	0	0	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- The student will understand the interdisciplinary nature of chemistry and to integrate knowledge of mathematics, physics and other disciplines to a wide variety of chemical problems.
- The student will understand the importance of the Periodic Table of the Elements, how it came to be, and its role in organizing chemical information.
- The student will acquire a foundation of chemistry of sufficient breadth and depth.

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Atomic Structure, Molecular Mass, Acids and Bases** Atom Definition Fundamental particles of Atom their Mass, Charge and Location. Atomic number and Mass number, Definition Isotopes and Isobars with suitable examples. Formation of cation and anion by electronic concept of oxidation and reduction.	05	15
2.	**Molecular Mass** Molecule, Molecular Formula, Molecular Mass, Mole, Definition Simple calculations. Avogadro's Hypothesis – Relationship between Molecular Mass and vapour Density, Avogadro Number.	05	10
3.	**Chemical Bonding and Structure of Molecules** Chemical Bond, Valence, Valence Electrons, Bonding and Non Bonding Electrons, Lewis Symbols, Octet Rule. Definition, Condition for Formation of Ionic Bond, Factors Governing Formation of Ionic Bond, Metallic Bond, Covalent Bond and Co-ordinate Covalent Bond: Hydrogen Bonding,	06	15
4.	**Acids and Bases** Theories of Acids and Bases, Arrhenius Theory, Lowry – Bronsted Theory, Lewis Theory, Advantages of Lewis Theory, pH and pOH Definition, Numerical problems, Indicator, Definition and Examples,	06	10

	Buffer solution, Definition, Types of buffer solution with examples, Application of pH in Industries.		
Section II			
1.	**Solutions** Definition, Methods of expressing concentration of a solution Molarity, Molality, Normality, Mole fraction and Percentage Mass – Simple problems.	05	10
2.	**Colloids** True solution and Colloidal solution, Definition, Differences, Types of colloids – Lyophilic and Lyophobic colloids. Differences Properties, Tyndall effect, Brownian movement, Electrophoresis and Coagulation. Industrial applications of colloids, Smoke Precipitation by Cottrell's method, Purification of water, Cleansing action of soap, Tanning of leather and Sewage disposal.	06	15
3.	**Electrochemistry** Electrolyte definition, Strong and Weak electrolytes, Examples. Electrolysis definition, Mechanism, Industrial application of Electrolysis, Electroplating, Preparation of surface, Process Factors affecting the stability of the coating, Chrome plating, Electroless plating definition, Advantages of Electroless plating over electroplating , Applications of Electroless plating.	06	15
4.	**Electrochemical-Cell** Electrochemical Cell definition, Representation of a Cell, Single Electrode Potential definition, Galvanic Cell, Formation of Daniel Cell, Electrochemical Series, Definition and Significance, Electrolytic Concentration Cell definition and Formation.	06	10

List of Practical

Sr No	Name of Practical/Tutorial	Hours
1.	Using a chemical balance.	02
2.	Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.	04
3.	Demonstration: Preparation of solutions of different concentrations	04
4.	Preparation of standard solution of Oxalic acid.	04
5.	Preparation of standard solution of Sodium Carbonate.	04
6.	Determination of strength of a given solution of Sodium Hydroxide by titrating it against standard solution of Oxalic acid.	04
7.	Determination of strength of a given solution of Hydrochloric acid by titrating it against standard Sodium Carbonate solution.	04
8.	Determination of temporary and permanent hardness in water sample using EDTA as standard solution.	02
9.	Conduct metric titration of strong acid vs. strong base	02

Text Book(s):

Title	Author/s	Publication
Text Book of Engineering Chemistry	Chawla S.	Dhanpat Rai & Co. Pvt. Ltd., Delhi, 2003.
Engineering Chemistry	Sharma B. K.	Krishna Prakashan Media (P) Ltd, Meerut.,2001

Reference Book(s):

Title	Author/s	Publication
Concise Inorganic Chemistry	J.D. Lee	Wiley India
Textbook of Engineering Chemistry (4th Edition)	R. Gopalan, D. Venkappaya, S. Nagarajan	Vikas Publishing house Ltd.

Web Material Link(s):

https://onlinecourses.nptel.ac.in/noc21_cy45/preview

https://nptel.ac.in/noc/courses/noc17/SEM2/noc17-cy03/

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of performance of Practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal Viva consists of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral presentation consists of 15 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, students will be able to:

CO1	Implement and evaluate quality control procedures.
CO2	Perform and validate laboratory procedures to conduct tests.
CO3	Improve industrial or chemical processes and laboratory equipment.
CO4	Prepare and purify compounds using standard chemical procedure

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Atomic Structure, Molecular Mass, Acids and Bases	1, 2
2	Molecular Mass	1, 2, 3
3	Chemical Bonding and Structure of Molecules	1, 2, 3
4	Acids and Bases	2, 3, 4
5	Solutions	2, 3, 4
6	Colloids	2, 3, 4
7	Electrochemistry	1, 2, 5
8	Electrochemical-Cell	1, 2, 5

P P Savani University
Institute of Diploma Studies
Department of Civil Engineering

Course Code: IDCV1010
Course Name: Engineering Mechanics
Prerequisite Course(s):-

Teaching & Examination Scheme:

Teaching Scheme(Hours/Week)				Examination Scheme(Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	00	04	40	60	20	30	00	00	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- Understand different types of forces, systematic evaluation of effect of these forces, behavior of rigid and deformable bodies subjected to various types of forces, at the state of rest or motion of the particles.
- Understand behavior of structural element under the influence of various loads.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in%
1.	**Introduction Engineering Mechanics** Basic concepts: Definitions, Basic assumptions, Scalar & Vector quantities, Free, Forced and fixed vectors, Force System: Force, Classification & Representation,	02	10
2.	**Coplanar Concurrent Force system** Forceasa Vector, Composition of forces, Parallelogram Law, Resolution, Principle of Transmissibility of forces, Resultantofcoplanarforcesystem.,Equilibriumofcoplanarforcesyste m, Free body diagrams, Determination of reactions, Equilibrium of a body under three forces, Lami's theorem	09	20
3.	**Coplanar Non-Concurrent force systems:** Moment of a force, Vector representation, Moment for coplanar force system, Varignon's theorem, Couple, Vector representation, Resolution of a force into a force and a couple., force Systems: Coplanar Concurrent Force system and Coplanar Non-Concurrent force system.	09	20
	Section II		

4.	**Friction:** Introduction, Wet and Dry friction, Theory of Dry friction, Angle of friction, Angle of Repose, Cone of friction, Coulomb's laws of friction.	07	15
5.	**Centre of Gravity:** Center of Gravity, Center of Mass and Centroid of curves, areas, volumes, Determination of centroid by integration, Centroid of Composite bodies.	09	15
6.	**Moment of Inertia:** Definition of Moment of inertia of area, Perpendicular axis theorem and Polar moment of Inertia, Parallelax istheorem, Moment of inertia of simple areas by integration, Moment of Inertia of Composite Areas., Moment of Inertia of masses, Parallel axis theorem for mass moment of inertia, Mass moment of inertia of simple bodies by integration, Mass moment of Inertia, for composite Bodies	09	20

List of Practical:

Sr.No.	List of Practical	Hours
1.	Coplanar Concurrent Forces	04
2.	Law of parallelogram	02
3.	Coplanar Non concurrent forces	02
4.	Lami's Theorem	02
5.	Coefficien of staticfriction	02
6.	Parallel force system	02
7.	Numerical practice on Force System	04
8.	Numerical practice on C.G.	04
9.	Numerical practice on M.I.	04
10.	Numerical practice on Friction	04

Reference Book(s):

Title	Author/s	Publication
Applied Mechanics	S. B. Junnarkar & H. J. Shah	Charotar Publication
Engineering Mechanics,	Meriam and Karaige,	Wiley-India
Engineering Mechanics: Statics & Dynamics	S Rajsekaran	Vikas Publication
Engineering Mechanics of Solids	Popov E.P	Prentice Hall of India
Engineering Mechanics,	Meriam and Karaige,	Wiley-India

Course Evaluation:

Theory:

- Continuous evaluation consists of two test search of 15marks and1 hour of duration.
- Submission of assignment which consists of solving 20 numerical and it carried10 marks of evaluation.
- End semester examination will consist of 60 marks exam.

Practical:

- Continuous Evaluation consists of performance of practical which should be evaluated out of 10marks for each practical and average of the same will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/drawing/test consists of 15marks during End Semester Exam.
- Viva/Oral performance consists of 15marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, students will be able to:

CO 1	Identify fundamental principles of mechanics, equilibrium, statics reactions and internal forces in statically determinate beams.
CO 2	Understand the basics of friction and its importance.
CO 3	Apply principles of statics to determine c.g and m.i of a different geometrical shape.
CO 4	Analyse problems and solve the problem related to mechanical elements and analyse the deformation behaviour for different types of loads.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction Engineering Mechanics	1,2
2	Coplanar Concurrent Force system	1,2,3
3	Coplanar Non-Concurrent force systems	1,2,3,5
4	Friction	1,2,3,4,5
5	Centre of Gravity	1,2,4,5
6	Moment of Inertia	2,2,4,5

P P Savani University
Institute of Diploma Studies
Department of IT Engineering

Course Code: IDIT1010
Course Name: Introduction to Computer Programming
Prerequisite Course (s): NA

Teaching & Examination Scheme:

Teaching Scheme(Hours/Week)				Examination Scheme(Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	04	00	05	40	60	40	60	00	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- Develop understanding of basic concepts that can be used in programming language.
- Develop the algorithm as well as flow chart for particular problem.
- Enforce logical thinking.
- Understand the fundamentals of programming concepts and methodology.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in%
1.	**Introduction to Programming Language** Classification of Programming Languages, Generations of Programming Languages-Machine Language, Assembly Language, High-Level Language, 4GL.	04	10
2.	**Introduction to C, Constants, Variables and Data Types:** Features of C Language, the Structure of C Program, Flow Charts and Algorithms Types of Errors, Debugging, Tracing the Execution of the Program, Watching Variables Values in Memory. Character Set, C Tokens, Key word and Identifiers, Constants and Variables, Data Types Declaration and Initialization, User Define Type Declarations –Type of Enum, Basic Input, and Output Operations, Symbolic Constants, Overflow and Under flow of Data.	08	18
3.	**Operators, Expressions, and Managing I/O Operations:** Introduction to Operators and its Types, Evaluation of Expressions, Precedence of Arithmetic Operators, Type Conversions in Expressions, Operator Precedence and Associatively. Introduction to Reading a Character, Writing a Character, Formatted Input and Output.	06	15
Section II			

4.	**Conditional Statements:** Decision Making & Branching: Decision Making with If and If – else Statements, Nesting of If-else Statements, The Switch and go-to statements, Ternary (?:) Operator. Looping: The while Statement, The Break Statement & The Do. While loop, The FOR loop, Jump Within loops-Programs.	07	15
5.	**Arrays:** Introduction, One-dimensional Arrays, Two-dimensional Arrays, Concept of Multidimensional Arrays.	07	14
6.	**Strings:** Declaring and Initializing String Variables, Arithmetic Operations on Characters, Putting Strings Together, Comparison of Two Strings, String Handling Functions.	06	14
7.	**User-Defined Functions:** Concepts of User-defined Functions, Prototypes, function Definition, Parameters, Parameter Passing, Calling a Function, Recursive Function, Macros and Macro Substitution	07	14

List of Practical:

Sr.No	List of Practical	Hours
1.	Introduction to C programming environment, compiler, Linker, loader, and editor. C Program to display "HELLOPPSU"	04
2.	Working with basic elements of C languages (different input functions, different output functions, different data types, and different operators)	08
3.	Working with C control structures (if statement, if-else statement, nestedif-else Statement ,switch statement, break statement, go to statement)	10
4.	Working with C looping constructs (for loop, while loop, do-while and nested For loop)	10
5.	Working with the array in C(1-Darray,and2-Darray)	08
6.	Working with strings in C (input, output, different string in built functions)	08
7.	Working with user-defined functions in C (function with/without return type, Function with/without argument, function and array)	08
8.	Working with recursive function in C	04

Text Book(s):

Title	Author/s	Publication
Programming in ANSI C	E. Balagurusamy	Tata Mc Graw Hill
Introduction to Computer Science	ITL Education Solutions Limited	Pearson Education

Reference Book(s):

Title	Author/s	Publication
Programming in C	Ashok Kamthane	Pearson
Let UsC	Yashavant P.Kanetkar	TataMcGrawHill
Introduction to C Programming	ReemaThareja	OxfordHigherEducation
Programming with C	ByronGottfried	TataMcGrawHill

Web Material Link(s):

- http://www.digimat.in/nptel/courses/video/106104128/L01.html
- https://www.youtube.com/watch?v=3QiItmIWmOM

Course Evaluation:

Theory:

- Continuous evaluation consists of two test search of 15marks and1 hour of duration.
- Submission of assignment which consists of solving 20 numerical and it carried10 marks of evaluation.
- End semester examination will consist of 60 marks exam.

Practical:

- Continuous Evaluation consists of performance of practical which should be evaluated out of 10marks for each practical and average of the same will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/drawing/test consists of 15marks during End Semester Exam.
- Viva/Oral performance consists of 15marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, students will be able to:

CO 1	Infer the basic concepts of data representation, algorithms and coding methods in computer system.
CO 2	Interpret the knowledge about c programming syntax.
CO 3	Apply basic principles of imperative and structural programming to solve complex problems.
CO 4	Design, develop and debug programs of c programming language.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction to Programming Language	1, 2
2	Introduction to C, Constants, Variables and Data Types:	1, 2, 3
3	Operators, Expressions, and Managing I/O Operations	2,3,4,6
4	Conditional Statements	2,4,5
5	Arrays	2, 4,6
6	Strings	2, 4,6
7	User-Defined Functions	2,4,6

P P Savani University
Institute of Diploma Studies

Department of Science & Humanities

Course Code: IDSH1060
Course Name: Electrical & Electronics Workshop
Prerequisite Course(s): Concept of Science up to 9th Standard

Teaching & Examination Scheme

Teaching Scheme(Hours/Week)				Examination Scheme(Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
0	2	0	1	00	00	20	30	0	0	50

Objective(s) of the course:
To help learner to

- Think in core concept of their engineering application by studying various topics involved in branch specific applications.
- Identify basic fundamental electronic components in circuits.
- Learn to use common electronic component to bread board.
- Understand component instruments, terminology and applications.
- Demonstrate the ability to collect and analyze data and to prepare co herent reports of hisorher findings.

Sr.No.	List of Practical	Hours
1	To Understand & Draw the symbols of various electronic devices.	2
2	To identify resistors, capacitors using Different codes.	2
3	Verification of Truth table so f Logic Gates(NAND,NOR,EX-OR,AND,OR, NOT).	4
4	To study cathode ray oscilloscope and perform measurements.	4
5	To study digital multi-meter and perform testing of various components.	2
6	To study soldering-de-soldering techniques.	2
7	To study wiring diagram of ceiling Fan.	2
8	How Fluorescent Lights Work.	2
9	To study about staircase wiring two-way switch.	2
10	Explaining the function of Refrigerator and Air conditioner.	4
11	Explaining the core concept to of power transmission.	4

Evaluation:

- Continuous Evaluation consist so of performance of practical which will be evaluated out of 10 Marks for each practical and average of the same will be converted to20 marks.
- Internal viva consists of 30marks.

Course Outcome(s):

After the completion of the course, students will be able to:

CO 1	Identify the ability to design various electronic circuit on a bread board
CO 2	Recognize the basic electronic devices and components in a circuit connection.
CO 3	Identify the ability to design a PCB.
CO 4	Define the practical side of basic physics laws.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Electronic Components	1,2,3,4
2	Electronic Devices	1,2,3,4
3	Understanding of Breadboard	1,2,4,5,6
4	Wiring of Breadboard	1,2,4,5,6
5	Ohm’s Law	1,2,3,4
6	Rectifiers	1,2,3,5,6
7	KCL & KVL	1,2,3,4,6
8	LDR	1,2,3,6
9	Electricity Lab	1,2,3,4
10	CRO	1,2,4,5
11	PCB	1,2,6

P P Savani University
Centre for Language Studies

Course Code: CFLS1040
Course Name: Functional English-II
Prerequisite Course(s): -- CFLS1030 Functional English-I

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
				Theory		Practical		Tutorial		
Theory	Practical	Tutorial	Credit	CE	ESE	CE	ESE	CE	ESE	Total
02	00	00	02	40	60	00	00	--	--	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to:

- Understand difference between formal and functional English.
- Use English in daily life.
- Communicate thoughts.
- Be an efficient Listener.
- Be an efficient speaker.
- Sharpen reading skills.
- Improve writing skills.

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction to Functional English** • Formal Vs. Functional English • Functional English in daily life • Importance of LSRW Skills	03	10
2.	**Listening** • Difference between Hearing and Listening • Listening to get information • Listening to understand • Listening instructions to follow	05	20
3.	**Speaking** • Introducing Self • Expressing likes and dislikes • Talking about Family • Describing Surrounding • Narrating Memorable Incidents • Inquiring, Requesting, Ordering, Questioning, Answering	07	20
Section II			
1.	**Reading** • Reading to Comprehend	07	25

	• Read to Scan • Read to Skim • Reading information from authentic material • Reading Newspaper, Magazines, Books		
2.	**Writing** • Importance of Punctuations • Strategies to develop Paragraphs • Paragraph writing by comprehending pictures, map, tables, and authentic material • Expressing like, dislikes, experiences • Narrating stories, incidents • Writing short letters	08	25

Text Book (s):

Title	Author/s	Publication
Communication Skills	ParulPopat&KaushalKotadia	Pearson, 2015

Reference Book (s):

Title	Author/s	Publication
Communication Skills, Second Edition	Sanjay Kumar, PushpLata	Oxford University Press,2015
Communication Skills for Engineers	Sunita Mishra	Pearson, 2011

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 25 marks. Test one can be based on Reading and Writing Skills whereas Test Two can be based on Listening and Reading Skills.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After completion of the course, the student will be able to

CO 1	Narrate incidents, events, experiences.
CO 2	Recognize the difference between formal and functional English.
CO 3	Comprehend authentic material.
CO 4	Define the need of Communication Skills in personal and professional life.
CO 5	Introduce them and talk about family efficiently.
CO 6	Identify their likes, dislikes, desires effectively.
CO 8	Practice scanning and skimming.
CO 9	Use punctuations accurately while writing.
CO 10	Recall listening skills.
CO 11	Draft paragraphs, and letters.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction to Functional English	2
2	Listening	2,4,5
3	Speaking	3,6
4	Reading	2,4,5
5	Writing	3,6

SECOND YEAR
DIPLOMA ENGINEERING

CONTENT

P P SAVANI UNIVERSITY															
INSTITUTE OF DIPLOMA STUDIES															
TEACHING & EXAMINATION SCHEME FOR DIPLOMA ENGINEERING PROGRAMME AY:2023-24															
Sem	Course Code	Course Title	Offered By	Teaching Scheme					Examination Scheme						
				Contact Hours				Credit	Theory		Practical		Tutorial		Total
				Theory	Practical	Tutorial	Total		CE	ESE	CE	ESE	CE	ESE	
3	IDCH2010	Fluid Flow Operation	CH	2	4	0	6	4	40	60	40	60	00	00	200
	IDCH2021	Industrial Stoichiometry	CH	2	0	2	4	4	40	60	00	00	00	00	150
	IDCH2030	Chemical Process Technology	CH	2	4	0	6	4	40	60	40	60	00	00	200
	IDCH2040	Industrial Safety & Environmental Engineering	CH	1	0	0	1	1	50	00	00	00	00	00	50
	IDCH2050	Chemical Engineering Thermodynamics	CH	3	0	2	5	5	40	60	00	00	50	00	150
	IDME2010	Basic Engineering Drawing	ME	2	4	0	6	4	50	00	40	60	00	00	150
						Total	**28**	**22**							**900**
4	IDCH2060	Mass Transfer-I	CH	2	4	0	6	4	40	60	40	60	00	00	200
	IDCH2070	Instrumentation	CH	2	4	0	6	4	40	60	40	60	00	00	200
	IDCH2081	Plant Utilities & Energy Engineering	CH	2	0	0	2	2	40	60	00	00	00	00	100
	IDCH2090	Mechanical Operation	CH	2	4	0	6	4	40	60	40	60	00	00	200
	IDCH2100	Process Heat Transfer	CH	2	4	0	6	4	40	60	40	60	00	00	200
	IDCH2110	Fertilizer Technology	CH	2	0	2	6	4	40	60	00	00	20	30	150
						Total	**26**	**22**							**1050**

P P Savani University
Institute of Diploma Studies
Department of Chemical Engineering

Course Code: IDCH2010
Course Name: Fluid Flow Operation
Prerequisite Course(s): --

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	4	0	4	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to
- The student will understand the type of fluids
- The student will understand the flow of fluids

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Introduction to fluids** Properties of fluids- Density and viscosity (absolute and kinematic), Vapour pressure and surface tension, cohesion and adhesion, Principle of Hydrostatic Equilibrium Manometers- Types of Manometers (U, Inclined, Differential), Equations, Uses Types of Fluids- Ideal and Actual fluids, Compressible and Incompressible Fluids, Newtonian and Non-Newtonian fluids including time dependent and time independent fluids.	05	15
2.	**Flow of Fluids (Incompressible)** Fluid flow, stream line flow, steady and unsteady state flow, uniform and non uniform flow, rotational and irrotational flow. Equation of continuity, Calculation of mass flow rate, volumetric flow rate, average velocity and mass velocity. Bernoulli's Theorem by Euler's equation and its application, Bernoulli's equation for ideal fluid, actual fluid and with pump work done. Correction in Bernoulli's equation.	05	20
Section II			
3.	**Measurement of flow** Measurement of fluid flow with the help of flow meters- Venturimeter: Construction Principle, Working, Coefficient of discharge, Calibration, Derivation, Orifice meter: Construction, principle, Working, Coefficient of discharge, Calibration, Derivation for calculating the flow rates, Rota meter: construction, principle working and Calibration, Pitot tube: Construction, Principle and Working. Nozzle meter: construction, principal working, derivation for calculating flow rates.	05	15

4.	**Pipe, fitting and valves** Standard sizes of pipes, wall thickness, Schedule number, BWG Number Joints and fittings, Gate valve, Globe valve, Ball valve, Needle valve, Non return value, Butterfly valve, Diaphragm valve	05	10
5.	**Transportation of Fluids** Pumps-Centrifugal Pump: Parts of centrifugal pump, working of Centrifugal pump, Performance of centrifugal pump (Characteristics of centrifugal pump), Characteristics curves, priming, Developed Head, Cavitation, Net Positive	05	25
6.	**Pump types** Suction Head (NPSH) Priming. Positive displacement reciprocating pumps based on pressure component and based on action of piston/plunger, their construction & working, Gear pump, its construction and working, Diaphragm pump, its utility, construction and working, Screw pump, characteristic curve of pump.	05	15

List of Practical

Sr No	Name of Practical/Tutorial	Hours
10.	Determination of coefficient of discharge of venture meter and plot a calibration curve	02
11.	Determination of coefficient of discharge of orifice meter & plot a calibration curve	08
12.	To calibrate a rotameter for different liquids and plot the calibration curve.	08
13.	To perform experiment on Bernoulli's Theorem and prove that the summation of pressure head, kinetic head and potential head is constant.	08
14.	Determination of equivalent length of pipe fittings	08
15.	To plot characteristics curves of centrifugal pump	08
16.	To measure the viscosity of different liquids (Ostwald's Viscometer or Redwood Viscometer)	08
17.	To measure the flow rate of gases using flow meter.	08
18.	To measure the major and minor loses in pipes.	02

Text Book(s):

Title	Author/s	Publication
Unit Operations of Chemical Engineering	McCabe, Smith.	McGraw Hill
Chemical Engineering Volume-1	Richardson & Coulson	Pergamon Press

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of performance of Practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal Viva consists of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral presentation consists of 15 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, students will be able to:

CO1	Identify fluid properties and memorize the concepts of pressure
CO2	Classify different types of fluid and generalize the concepts of boundary layer and its estimation in different flows
CO3	Apply and demonstrate the basic equations of fluid flow.
CO4	Evaluate and compare the performance of various fluid flowing machinery i.e pumps and compressor and metering devices i.e. flow meters.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction to fluids	1,2
2	Flow of Fluids (Incompressible)	2,3
3	Measurement of flow	2,3,4,
4	Pipe, fitting and valves	2,3,5
5	Transportation of Fluids	3,4,5
6	Pump types	4,5

P P Savani University
Institute of Diploma Studies
Department of Chemical Engineering

Course Code: IDCH2021
Course Name: Industrial Stoichiometry
Prerequisite Course(s): -Fundamentals of Chemistry (IDSH1050)

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	0	2	4	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- It is expected that this course will lay the foundation of basic knowledge and calculation skills that is frequently used in subsequent chemical engineering courses as well as professional life

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Unit Systems:** Introduction to process calculation, dimensions and systems of units, fundamental quantities of units, derived quantities, definition and units of force, volume, pressure, work, energy, power, heat, unit conversions in FPS, MKS and SI systems	03	10
2.	**Basic Chemical Calculations:** Definition and calculations of mole, atomic weight, molecular weight, equivalent weight, specific gravity and API gravity. Composition of solid, liquid by weight % and mole %, morality, normality, morality, gm/lit.	04	15
3.	**Ideal gas law:** Concept of ideal gas, derivation of ideal gas law, definition of STP and NTP, Dalton's law and Amagat's law, derive relation between mole%, volume% and pressure% of ideal gases, calculation of average molecular weight, density, mole%, weight % in gas mixture in SI/MKS systems.	03	15
Section II			
4.	**Material Balance in Processes Without Chemical Reactions:** Law of conversation of mass, brief description and simple material balance calculation of drying, distillation, absorption, mixing, crystallization, evaporation, single stage material balance calculation of leaching and extraction, brief idea regarding recycling and by-passing operation.	06	15
5.	**Material Balance in Processes Involving Chemical**	05	15

	Reactions: Definition: Limiting reactant, excess reactant, conversion, yield and selectivity, simple numerical for finding yield, conversion and composition, simple calculation of material balance based on reaction.		
6.	**Energy Balance:** Heat capacity and specific heat, mean heat capacity of gases, heat capacity of gas mixture and liquid mixture, calculations of heat capacity by integral equation up to three terms, brief explanation of sensible heat and latent heat of fusion, sublimation, vaporization, calculations of standard heat of formation from heat of combustion data, calculations for heat of reaction from heat of formation and heat of combustion data	05	20
7.	**Combustion:** Introduction of combustion, types of fuels, calorific values of fuels, proximate and ultimate analysis of solid fuel, numerical related to calorific values of fuel from composition, numerical related to air, requirement and composition of flue gases.	04	10

Text Book(s):

Title	**Author/s**	**Publication**
Stoichiometry	Bhatt B.I. and Vora S.M.	Tata McGraw-Hill, 1976
Basic Principles and Calculations in Chemical Engineering	Himmelblau David M. Riggs B. James	8th Ed., PHI, Eastern Economy Edition

Reference Book(s):

Title	**Author/s**	**Publication**
Introduction to Process Calculations Stoichiometry	Gavhane K. A.	Nirali Prakashan, Pune,Year-2012

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests of 30 marks each and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty Evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After the completion of the course, students will be able to:

CO1	Discriminate the material balance of various process streams.
CO2	Estimate the heat balance of various process steams.
CO3	Assess the heat balance of various process steams.
CO4	Appraise the various properties like temperature, pressure, heat, mass, calorific value.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Unit Systems	1
2	Basic Chemical Calculations	2,3
3	Ideal gas law	1,2,3
4	Material Balance in Processes Without Chemical Reactions	2,3,5
5	Material Balance in Processes Involving Chemical Reactions	2,3,5
6	Energy Balance	4,5
7	Combustion	5,6

P P Savani University
Institute of Diploma Studies
Department of Chemical Engineering

Course Code: IDCH2030
Course Name: Chemical Process Technology
Prerequisite Course(s): --

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	4	0	4	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- The student will understand the type of chemical processes
- The student will understand the basics of chemical process industries

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Introduction** Introduction of Chemical process industries with reference to Indian resources, trade and export potential. Process symbols used for various equipment, Uses of different process equipment	05	15
2.	**Sugar Industry** Manufacturer of cane sugar, Various engineering problems encountered in sugar industry, Pollution abatement in sugar industry	05	20
3.	**Fermentation Industry** Introduction of fermentation industry, Types of fermentation processes, Production of ethyl alcohol by fermentation, Industrial alcohol, manufacture of industrial alcohol-beers, wines and liquors	05	15
Section II			
4.	**Soaps and Detergent Industry** Manufacturing of soap, glycerin as by products from soap Manufacturing of detergents (including raw material and manufacturing process), Manufacturing of House disinfectants Various engineering problems encountered in soaps and detergent industry	05	10
5.	**Pulp and Paper Industry** Different pulping process, Manufacturing of paper, Role of additives, Various engineering problems encountered in paper	05	25

	industry. Pollution abatement in pulp and paper industry.		
6.	**Polymer Industry** Types of polymer, polymerization process, manufacture of polyethylene, styrene nylon6, nylon 66, rayon. Manufacture of rubber	05	15

List of Practical

Sr No	Name of Practical/Tutorial	Hours
1	Preparation of Phenyl (domestic disinfectant)	06
2	Preparation of Soap by Coconut Oil	08
3	Preparation of Soap by mustard oil	08
4	Preparation of Detergent/liquid detergent	08
5	Atmospheric distillation of petroleum fraction analysis to petroleum	08
6	Preparation of polymer by Bulk Polymerization.	08
7	Preparation of Thermo Plastics PMMA	08
8	Preparation of phenyl formaldehyde Resin	06

Text Book(s):

Title	Author/s	Publication
Chemical Technology	M. Gopala Rao	East west publication

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of performance of Practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal Viva consists of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral presentation consists of 15 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, students will be able to:

CO1	Identify and describe basic equipment used in process industries.
CO2	Explain the basic process industry drawings.
CO3	Demonstrate the ability to apply basic concepts of chemistry and physics within process industries.
CO4	Correlate the importance of quality, safety, health and environment to the process industry.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction	1
2	Sugar Industry	2,3
3	Fermentation Industry	2,3,4,
4	Soaps and Detergent Industry	3,5,6
5	Pulp and Paper Industry	3,5,6
6	Polymer Industry	3,5,6

P P Savani University
Institute of Diploma Studies
Department of Chemical Engineering

Course Code: IDCH2040
Course Name: Industrial Safety & Environmental Engineering
Prerequisite Course(s): --

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
1	0	0	1	00	00	20	30	0	0	50

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- knowledge of different types of pollution caused due to industrialization.
- Know various types of accidents which occur in chemical plants and how to safeguard them to avoid injury to men and material.

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**General Introduction & Concept of Safety:** Safety of organization, Safety measures Concept &Importance of safety in chemical industries.	01	10
2.	**Chemical & Fire Hazards & their Control:** Definition, sources & classification of hazards like chemical, fire, Different methods for controlling chemical & fire hazards, Objective & importance of fire prevention, fire extinguishing agents & devices with their working.	04	25
3.	**Personal Protective Devices:** Protective devices for head, ears, eyes, face, respiratory system, hand, feet etc.	01	10
Section II			
4.	**Introduction to pollution:** Introduction to environmental pollution, sources of pollutants, effects of pollution on human health, vegetation, animal life & effect on environment.	02	15
5.	**Air Pollution:** Sources & Types of air pollutant, classification, properties of air pollutant, effect of air pollution, Air pollution control methods like gravitational settling, Diffusion, Electrostatic precipitation, Centrifugal impaction, Direct interception etc.	03	20
6.	**Water pollution:** Introduction, characterization of water, BOD, COD, VM, SM, classification of sources.	02	10

7.	**Solid waste of disposal methods:** Sources of classification, Methods of disposal like dumping, sanitary land filling, incineration, composting etc.	02	10

Text Book(s):

Title	Author/s	Publication
Environmental Pollution control engineering	C. S. Rao	New Age International Publications.

Reference Book(s):

Title	Author/s	Publication
Fundamentals of air & water pollution	P. C. Mishra	APH Publishing 2008
Pollution Control in process Industries	S. P. Mahajan	TMH Publication
Safety management	John V. Grimaldi	Richard D. Irwin; 4th Edition

Course Evaluation:

Practical:

- Continuous Evaluation consists of performance of Practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal Viva consists of 10 marks.
- 30 marks for the Report submission based on technical visit at one chemical industry.

Course Outcome(s):

After the completion of the course, students will be able to:

CO1	Identify instrument for the p, t ,v measurement of given parameter.
CO2	Identify the causes of accident and explain various controlling methods.
CO3	Acquainted with the principles of environment & ergonomics.
CO4	Familiarise with process safety management (psm) as per osha

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	General Introduction & Concept of Safety:	1,2
2	Chemical & Fire Hazards & their Control:	2,3
3	Personal Protective Devices:	2,3,4
4	Introduction to pollution:	1,2
5	Air Pollution:	2,3,5
6	Water pollution:	2,3,5
7	Solid waste of disposal methods:	1,2,3,5

P P Savani University
Institute of Diploma Studies
Department of Chemical Engineering

Course Code: IDCH2050
Course Name: Chemical Engineering Thermodynamics
Prerequisite Course(s): --

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	0	2	4	40	60	00	00	50	0	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to
It is a core subject of Chemical Engineering and is essential for understanding basic concepts, thermodynamic properties of fluid and performance of thermal systems used in industry.

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Introduction and Basic Concepts** Systems, processes and surroundings, homogenous and heterogeneous systems, closed, open and isolated, intensive and extensive properties, state and path functions. Concept of internal energy, enthalpy, entropy, free energy and equilibrium equation of state, ideal gas law, Vander Waals equation. Amagat's law, Dalton's law, Henry's law, Zeroth law of thermodynamics.	08	25
2.	**First Law of Thermodynamics for Open and Closed System** Statement of first law of thermodynamics, use of steam tables, calculation of internal energy, enthalpy, heat and work for ideal gas undergoing reversible, isothermal, Isobaric, adiabatic and polytrophic process. T-V, P-V and P-T diagrams.	08	10
3.	**Second Law of Thermodynamics** Statement of second law of thermodynamics: Kelvin Plank statement and Classius statement, Carnot cycle and its efficiency, concept of entropy and entropy change for closed and open system. Heat pump and heat engine (coefficient of performance and efficiency). Reversible and irreversible process. Thermodynamic temperature scale. Thermal thermodynamic equation, Maxwell relation. Third Law of Thermodynamics	08	15
Section II			
4.	**Entropy** Inequality of Classius, entropy-a property of a system entropy	06	15

	change in reversible process, entropy change for an open system, principle of increase of entropy, efficiency, irreversibility.		
5.	**Applications of Second law of Thermodynamics** Refrigeration, vapor compression and absorption refrigeration cycle, air refrigeration cycle, types of compressors, reciprocating air compressor, single stage compressor, and isentropic efficiency of compressor, coefficient of performance(COP), liquefaction process, latest refrigerants- their qualities and applications.	07	15
6.	**Chemical Reaction Equilibrium and Vapor Liquid Equilibrium** Concept of chemical potential, Gibb's Duhen Equation, Raoul's law, Gibb's phase rule, vapor liquid equilibrium, dew point and bubble point, calculations for two component systems, fugacity, fugacity, fugacity coefficient, activity and activity coefficient.	08	20

Text Book(s):

Title	Author/s	Publication
Chemical Engineering Thermodynamics	K.A. Gavhane	Nirali Publication
Chemical Engineering Thermodynamics	Dodge	McGraw Hill

Reference Book(s):

Title	Author/s	Publication
Chemical Engineering Thermodynamics	K.V. Narayanan	Prentice Hall India
Engineering Thermodynamics	PK Nag	McGraw Hill

Web Material Link(s):

http://nptel.ac.in/courses/103106070/

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of performance of Practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal Viva consists of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral presentation consists of 15 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, students will be able to:

CO1	Illustrate the application of first law and second law to the problem of phase
CO2	Estimate the efficiency of heat equipments for a given duty.
CO3	Distinguish systems, functions, properties and processes.
CO4	Implement the various law of thermodynamics for non flow & flow process and access the pvt behavior of the fluids.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction and Basic Concepts	1,2
2	First Law of Thermodynamics for Open and Closed System	1,2,3
3	Second Law of Thermodynamics	2,3,4,
4	Entropy	2,4,5
5	Applications of Second law of Thermodynamics	2,5,6
6	Chemical Reaction Equilibrium and Vapor Liquid Equilibrium	2,3,5,6

P P Savani University
Institute of Diploma Studies

Department of Mechanical Engineering

Course Code: IDME2010
Course Name: Basics of Engineering Drawing
Prerequisite Course(s):--

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	04	00	06	50	00	100	00	00	00	150

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- Understand the language and familiarize with Indian Standards related to engineering drawings
- Develop drafting and sketching skills, application of drawing equipment's.
- Read various engineering curves, projections and dimensioning styles.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction** BIS SP-46, Drawing Instruments and their uses, Letters and numbers– Standard Sizes and Layout of drawing sheets-Types of lines and their applications- Different types of Dimensioning techniques, Scale (reduced, enlarged & full size), plain scale and diagonal scale, Geometrical constructions.	04	14
2.	**Orthographic projections of points and lines:** Introduction to orthographic projection, First angle and Third angle method, their symbols. Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces. Projections of points Projections of lines in different quadrants, inclinations, True lengths of the lines projections on auxiliary planes	10	34
3.	**Projections of plane figures:** Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one or both reference planes).	05	15
Section II			
4.	**Projection of solids:** Types of Solid. Projection of Cone, Cylinder, Prism &pyramids. Simple cases when solid are placed in different positions Axis faces and tines lying in the faces of the solid making given angles.	06	22
5.	**Isometric projection:** Introduction to isometric projections. Isometric scale and Natural scale. Isometric view and isometric projection. Illustrative problems related to objects containing lines, circles and arcs shape only	05	15

List of Practical:

Sr No	Name of Practical	Hours
1.	Letters and numbers, Dimensioning techniques, Scale (reduced, enlarged & full size), plain scale and diagonal scale, Geometrical constructions.	02
2.	Orthographic projections of points and lines:	15
3.	Projections of plane figures	15
4.	Projection of solids	12
5.	Isometric projection	16

Text Book(s):

Title	Author/s	Publication
A Text Book of Engineering Graphics	P J Shah	S. Chand & Company Ltd., New Delhi
Engineering Drawing	N D Bhatt	Charotar Publishing House, Anand

Reference Book(s):

Title	Author/s	Publication
Engineering Drawing	P.S.Gill	S. K. Kataria& sons, Delhi
Engineering Drawing	B. Agrawal & C M Agrawal	Tata McGraw Hill, New Delhi
Engineering Drawing made Easy	K. Venugopal	Wiley Eastern Ltd

Web Material Link(s):

- http://nptel.ac.in/courses/105104148/

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 20 marks as per the guidelines provided by the course coordinator.

Practical:

- Continuous Evaluation consists of Performance of Practical/Tutorial which will be evaluated out of 10 for each practical/Tutorial and average of the same will be converted to 20 Marks.
- Internal Viva consists of 30 Marks.
- Practical performance/quiz/drawing/test of 50 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, students will be able to:

CO1	Interpret engineering drawing as a techincal comuunication language.
CO2	Understand different dimensioning methods and its use in drawings.
CO3	Relate the use of engineer's scale to different engineering fields.
CO4	Identify the use of orthographic & isometric projection in real time applications.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction	1,2
2	Orthographic projections of points and lines	1,5,6
3	Projections of plane figures	2,4,6
4	Projection of solids	2,4,6
5	Isometric projection	2,5,6

P P Savani University
Institute of Diploma Studies
Department of Chemical Engineering

Course Code: IDCH2060
Course Name: Mass Transfer - I
Prerequisite Course(s): --

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	4	0	4	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- gain knowledge of basic fundamentals of mass transfer operations such as diffusion, leaching, absorption etc.
- gain knowledge of fundamental principles, design aspects, equations, associated problems, industrial applications of all-important unit operations.
- equip them with the essential knowledge and skills required to appear in campus interview or work as an engineer in the chemical industries with confidence.

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Introduction:** Importance of mass transfer operations, classification of mass-transfer operations, methods of conducting mass transfer operations and fundamental design principles.	02	10
2.	**Molecular Diffusion Of Fluids:** Concept of molecular and eddy diffusion, Fick's law for diffusion, general equation for steady-state molecular diffusion in fluid within laminar flow, thermal diffusion, simple problems on diffusion by direct use of formula.	05	15
3.	**Inter phase Mass Transfer:** Concept of equilibrium, local and average overall mass transfer coefficient, film theory, penetration theory, analogy between mass and momentum transfer and concept of stage, stage efficiency, cascade etc.	05	20
Section II			
4.	**Gas Absorption:** Definition and application of absorption, equilibrium solubility of gases in liquids, effect of temperature and pressure on solubility, characteristics of ideal liquid solutions of Raoult's law, choice of solvents, material balance for the component	06	20

	transfer in countercurrent and concurrent flow, concept of HETP and simple problems on absorption.		
5.	**Liquid-Liquid Extraction:** Definition and application of liquid extraction, liquid equilibrium for three component system, equilibrium triangular coordinates, system of three liquids one pair partially soluble, effect of temperature and pressure on the solubility curve, choice of solvents for the operation, simple problems using direct formula.	05	15
6.	**Leaching:** Definition and industrial application of leaching, preparation of solid, methods of operations and equipment for in place leaching and heap leaching, shanks system, filter press leaching and equipment like Rotacel, Kennedy extractor and Balloman extractor.	04	10
7.	**Equipment for Gas-Liquid Operation:** Construction and working of gas dispersed equipment like bubble column (Sparged vessel), agitated vessel, tray tower etc. and liquid dispersed equipment like venturi scrubbers, wetted wall column, spray tower, packed tower and comparison between tray and packed tower.	03	10

List of Practical

Sr No	Name of Practical/Tutorial	Hours
1.	Solid In Air Diffusion (Vaporization Of Naphthalene Balls)	08
2.	Vapour In Air Diffusion - To determine the diffusion coefficient of an organic vapor (i.e. CCl4) in air.	08
3.	Liquid – Liquid Diffusion - To study the effect of temperature on the diffusion coefficient.	08
4.	York Scheibel's Extraction Unit	08
5.	Absorption in sieve plate column	08
6.	Vapor-Liquid Equilibrium Set-up	08
7.	Leaching Experiment	08
8.	Wetted Wall Column Experiment	04

Text Book(s):

Title	Author/s	Publication
Mass Transfer operation	R.E. Treybal	Mc-Graw Hill International Editions
Mass Transfer	Sherwood, Pigford & Wilke	Mc-Graw Hill International Editions

Reference Book(s):

Title	Author/s	Publication
Perrys Chemical Engineers Handbook	Perry & Green	Mc-Graw Hill International Editions
Chemical Engineering	Coulson, J.M., Richardson, J.F.	Pergamon and ECBS, 1970
Unit operations of Chemical Engg.	W.L. McCabe, J.C. Smith &Harriott	Mc-Graw Hill International Editions

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests of 30 marks each and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty Evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consist of performance of Practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal Viva consists of 10 mark.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral presentation consists of 15 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, students will be able to:

CO1	Distinguish the basics of mass transfer & important to build a knowledge of the mass regarding laws.
CO2	Identification of mechanisms of mass transfer, formulation of rate equations.
CO3	Evaluate the solutions of the differential equations for steady state & non steady state problems.
CO4	Generalize various mass transfer equipments.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction	1,2
2	Molecular Diffusion Of Fluids	1,2
3	Inter phase Mass Transfer	1,2
4	Gas Absorption	2,3,4
5	Liquid-Liquid Extraction	2,5,6
6	Leaching	3,4,5
7	Equipment for Gas-Liquid Operation	3,5,6

P P Savani University
Institute of Diploma Studies
Department of Chemical Engineering

Course Code: IDCH2070
Course Name: Instrumentation
Prerequisite Course(s): --

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	4	0	4	40	60	40	60	00	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- It is expected that this course will lay the foundation of basic knowledge about instrumentation skills that is frequently used in subsequent chemical engineering courses as well as professional life.

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Introduction to Instrumentation:** Elements of instruments, static and dynamic characteristics, basic concepts of response of first order type instruments, mercury in glass thermometer, bimetallic thermometer, pressure spring thermometer, static accuracy and response of thermometers.	03	10
2.	**Pressure Measurement:** Pressure, vacuum and head manometers, measuring elements for gage pressure and vacuum, measuring pressure in corrosive liquids, measuring of absolute pressure, static accuracy and response of pressure gages.	04	15
3.	**Temperature Measurement:** Industrial thermocouples, thermocouple wires, thermo couple wells and response of thermocouples.	06	20
Section II			
4.	**Flow Measurement:** Head flow meters, open channel meters, area flow meters, flow of dry materials, viscosity measurement.	06	20
5.	**Level Measurement:** Direct measurement of liquid level, level measurement in pressure vessels, measurement of interface level, level of dry materials.	05	15
6.	**Instruments for Analysis:** Recording instruments, indicating and signaling instruments, instrumentation diagram.	06	20

List of Practical:

Sr. No.	Name of Practical	Hours
1	Study and use Pressure sensing elements.	08
2	Study and use Flow measuring instruments.	08
3	Study and use level measuring instruments.	08
4	Study and use temperature measuring instruments.	08
5	Study block diagram of DCS.	08
6	Study block diagram of PLC.	08
7	Study applications of controllers.	06
8	Verify Ohm's law.	06

Text Book(s):

Title	**Author/s**	**Publication**
Industrial instrumentation	Donald P Eckman	John Wiley and Sons Ltd, 1950
Industrial Instrumentation & Control	S. K. Singh	McGraw Hill Education India, 1987

Reference Book(s):

Title	**Author/s**	**Publication**
Process Control Instrumentation Technology	Johnson	John Wiley & Sons; 3rd edition (26 October 1988)

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests of 30 marks each and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty Evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After the completion of the course, students will be able to:

CO1	Apply the fundamentals of instrumentation in measurements and calibration of instruments.
CO2	Summarize information about common instruments on the chemical process systems.
CO3	Generalize the pressure, temperature & level instrument for the measurement of chemical devices.
CO4	Illustrate the construction and working principle of various type of transducers/sensor to measure physical quantities.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	**Content**	**RBT Level**
1	Introduction to Instrumentation	1,2
2	Pressure Measurement	1,2,3
3	Temperature Measurement	1,2,3
4	Flow Measurement	1,3,4
5	Level Measurement:	2,3,4
6	Instruments for Analysis:	3,4,5

P P Savani University
Institute of Diploma Studies
Department of Chemical Engineering

Course Code: IDCH2081
Course Name: Plant Utilities & Energy Engineering
Prerequisite Course(s): -Industrial Safety & Environmental Engineering (IDCH2040)

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	0	0	1	40	60	00	00	00	00	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- Know renewable source of energy and their futuristic scope.
- Understand the designing the process plants or creating design layouts of plant.
- Understand fundamentals of chemical engineering viz. development of flow diagrams, importance of various design consideration during the development and design of any process.
- Rapidly increase advancement of knowledge and relevant importance and application of various process auxiliaries and utilities used in industries.
- Deals with the basics as well as advanced understanding of various process auxiliaries and utilities used in chemical plant.

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Introduction:** Types of energy, energy crisis, Renewable sources of energy, conventional & Non-Conventional sources of energy, energy conservation.	02	10
2.	**Conventional fuels:** Classification, types, sources, properties, uses, storage, handling & selection factors of various conventional fuels in the form of a. Solid : Coal, Lignite, Coke b. Liquid : Gasoline, Kerosene, Naphtha, Fuel oil, Diesel c. Gaseous : N.G., Refinery gas, Water gas, Producer gas, Coke oven gas, LPG, Oil gas, Industrial Gases etc	06	20
3.	**Non-conventional sources of energy:** Solar energy : Solar radiation, collectors, storage & applications Wind energy : Introduction, nature of wind & wind farm Biomass energy : Introduction, Biomass conversion technology by wet & Dry process Geothermal energy: Introduction & Sources of geothermal energy.	07	20

	Nuclear energy : Introduction, Nuclear Fuels & Nuclear reactions, types of Propellant & moderators		
Section II			
4.	**Water & Steam:** Importance, Consumption & source of water, water analysis, types of hardness, methods of softening of water like lime soda, zeolite, ion exchange methods etc., Purification of water by screening, sedimentation, coagulation, filtration & sterilization, treatment for boiler feed water, Reuse & Recycling of process water, definition of enthalpy, wet steam, superheated steam, specific volume, Types-classification &comparison of steam generators, Factors affecting the selection of steam generator.	08	25
5.	**Air & Refrigeration:** Introduction, use of air as chemical raw material & utility, concept of compressed air, blower air, fan air, instrument air etc., various methods of refrigeration in brief like ice, evaporate, vapor, steam jet refrigeration etc, types of refrigerating agent like ammonia, carbon dioxide, methylene chloride, water brine etc., selection of refrigerating agents.	07	25

Text Book(s):

Title	Author/s	Publication
Process Plant layout and Piping Design	Roger Hunt and Ed Bausbacher	PTR Prentice-Hall Inc
Process utility systems	Jack Broughton	Institution of Chem. Engineers, U.K.

Reference Book(s):

Title	Author/s	Publication
Chemical Engineering Plant Design	F.C. Vibrandt and C.E. Dryden	McGraw Hill, Fifth Edition.
Plant design and Economics for Chemical Engineers	M.S. Peters and Timmerhaus	Mc Graw Hill 3rd Edition

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests of 30 marks each and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty Evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After the completion of the course, students will be able to:

CO1	Assess the basis of plant utilities and management process.
CO2	Justify the importance of process auxiliaries and utilities in a chemical industry.
CO3	Editorialize the conventional and non conventional sources and their utilization in industries.
CO4	Acquire an overview of key selection considerations of plant utilities.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	**Content**	**RBT Level**
1	Introduction	1,2
2	Conventional fuels	1,2,3
3	Non-conventional sources of energy	1,2,3
4	Water & Steam	2,3,4
5	Air & Refrigeration	4,5,6

P P Savani University
Institute of Diploma Studies
Department of Chemical Engineering

Course Code: IDCH2090
Course Name: Mechanical Operations
Prerequisite Course(s):--

Teaching & Examination Scheme:

Teaching Scheme(Hours/Week)				Examination Scheme(Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	04	00	04	40	60	40	60	00	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- Understand many basic principles of Chemical Engineering operations such as Size Reduction, Filtration, Sedimentation, Mixing and Agitation etc. and their mathematical co-relation.
- Understand the basic principles of particle preparation and their characterization.
- Study various methods for storage of solids and conveyors available for their transportation.
- Understand the performance of different equipment for separation of solids and size reduction

Course Content:

Section I			
Module No.	Content	Hours	Weightage in%
1.	**Properties of Particulate Solids** Fundamentals of Unit operation and Unit process, Specific properties of solids : Particle density and Bulk density, diameter, sphericity, equivalent diameter, specific surface area, volume surface mean diameter, mass mean diameter, and shape factor, Calculation of particle diameter, sphericity, equivalent diameter, specific surface area, volume surface mean diameter, mass mean diameter, and shape factor, numbers of particles in solid.	06	20
2.	**Screen Analysis** Basics of Ideal and actual screen, Types of screen analysis, Capacity and effectiveness of screen, Derivation of formula for overall effectiveness of screen, Calculation of capacity and effectiveness of screen.	04	10
3.	**Size Reduction** Principles of Size reduction and its application, Classification, comparison and selection of size reduction equipments based on size reduction principle, Laws of size reduction: (i) Rittingers law (ii) Bond's law (iii) Kick's law , Calculation of power required for size reduction using empirical laws.	04	15

Section II			
4.	**Sedimentation** Fundamentals of sedimentation, Batch sedimentation, Inter phase height Vs time curve for Batch sedimentation, Principle of flocculation, Principle, construction and working of Gravity thicker, Fundamentals of free and hindered settling, Principle construction and working of Cyclone separator.	04	15
5.	**Filtration** Basics of filtration, Classification of equipments for liquid-solid separation, Filter media and its characteristics, Constant rate filtration and constant pressure filtration, Filter media and its characteristics.	04	10
6.	**Separation of Solid Particles** Definition and application of solid separation, Factors affecting selection of equipment for solid separation, Working principle and construction of a) Jigging, b) Elutriation, c) Double cone classifier d) Electrostatic precipitator, e) Magnetic separator f) Froth flotation cell, Differential settling methods, sink and float method	04	15
7.	**Agitation and Mixing** Define agitation and mixing, give their applications, Classification of Impellers and brief explanation, Vortex formation and swirling, Methods of Vortex prevention, Flow number, Factors affecting agitation.	04	15

List of Practical:

Sr. No.	Name of Practical	Hours
1	Measure volume surface mean diameter, mass mean diameter, number of particles using sieve shaker	06
2	Carry out differential and cumulative screen analysis	06
3	Test Rittinger's law for grinding in ball mill and measure critical speed	06
4	Test Kicks law for crushing in jaw crusher	06
5	Test Bond's law for crushing in roll crusher	06
6	Measure efficiency of cyclone separator	06
7	Determine rate of settling by sedimentation	06
8	Measure rate of filtration in gravity filtration	06
9	Measure efficiency of separation in froth flotation cell	06
10	Measure rate of filtration in vacuum filtration	06

Text Book(s):

Title	Author/s	Publication
Unit Operations of Chemical Engineering	W L McCabe and J C Smith	McGraw-Hill International
Principles of Mineral Dressing	A M Gaudin	Tata McGraw-Hill Publishing Co. Ltd., New Delhi

Elements of Ore Dressing	A F Taggart	John Wiley and Sons, New York

Reference Book(s):

Title	Author/s	Publication
Chemical Engineering Vol.- II, 6th Ed.	J.M. Coulson & J.F. Richardson	Elsevier, 2003 or Pergamon Press
Unit Operations	G.G. Brown Ed.	John Wiley & Sons, 1950
Transport Processes and Separation Process Principles' 4th Ed,	C.G. Geankopolis	Prentice Hall India, 2003

Web Material Link(s):

- http://nptel.ac.in/syllabus/103107091

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests of 30 marks each and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty Evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination consists of 60 marks.

Tutorial:

- Continuous Evaluation consist of performance of Practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal Viva consists of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral presentation consists of 15 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, students will be able to:

CO1	Identify the practical importance and relevance of unit operations used for crushing, grinding and size separation in chemical industry.
CO2	Understanding fluid flow through fluidized bed
CO3	Evaluate the parameters of various filtration equipment and sedimentation.
CO4	Identify the different types of mixing, agitation and conveying of solids.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Properties of Particulate Solids	1,2
2	Screen Analysis	2,3
3	Size Reduction	2,5
4	Sedimentation	2,3,4,5
5	Filtration	4,5,6
6	Separation of Solid Particles	3,4,5
7	Agitation and Mixing	2,3,4,6

P P Savani University
Institute of Diploma Studies
Department of Chemical Engineering

Course Code: IDCH2100
Course Name: Process Heat Transfer
Prerequisite Course(s): --

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	4	0	4	40	60	40	60	00	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- Understand how to formulate and be able to solve one- and two-dimensional conduction.
- Most of the Chemical Engineering operations will involve either heat addition or heat removal in one way or the other.
- It is, therefore, extremely necessary to have good understanding about the heat transfer mechanisms.
- This subject enables the students to apply this knowledge for understanding the performances of various heat transfer equipment such as heat exchangers, condensers, evaporators etc. used in almost all chemical and related industries

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Modes of Heat Transfer** Conduction, Convection, Radiation, concept of steady state and unsteady state heat transfer.	05	10
2.	**Conduction** Fourier's law of heat conduction, thermal conductivity of materials – solids, liquids and gases and effect of temperature on thermal conductivity, one dimensional steady state heat conduction through a plane wall, composite wall and cylinder, multi-layer cylinder. Insulation and insulating materials, critical thickness of insulation.	05	15
3.	**Convection** Natural and forced convection, dimensional analysis and significance of various dimensional groups such as Reynolds number, Prandtl number, Nusselt number, Grasshof number, Stanton number. Peclet number, empirical correlations for free and forced convection. Dittus Boelter's equation, Sieder Tate Equation, simple numerical problems using Dittus Boelter equation, Sieder Tate equation.	05	15

4.	**Radiation** Reflection, absorption and transmission of thermal radiation, Emmisive power, Wein's displacement law, Stefan Boltzmann Law, Planck's law, Kirchhoff's law, Concept of black body, Grey body.	04	10
Section II			
5.	**Heat Exchanger** Introduction, classification, individual and overall heat transfer coefficient, fouling factor, roughness of surfaces and their effect, LMTD for parallel and counter current heat exchangers, construction and description of:- Concentric double pipe, Shell and tube (1-1 heat exchanger and 1-2 heat exchanger), Plate type heat exchanger.	04	20
6.	**Boiling and condensation** Interface, bubble and film boiling, boiling regime, Concept of condensation, types of condensation i.e. drop wise and film wise condensation.	02	15
7.	**Evaporators** Evaporation Capacity, Evaporation Economy, construction and description of open pan, long type vertical evaporator, falling film evaporator and agitated thin film evaporator, multiple effect evaporator, feeding arrangements- forward, backward, mixed and parallel feed.	05	15

List of Practical

Sr No	Name of Practical/Tutorial	Hours
1.	To determine Heat Transfer through Composite Wall at different temperature.	04
2.	Determination of Thermal Conductivity of Insulating Powder (Asbestos Powder).	08
3.	To find out Heat transfer in Double Pipe Heat Exchanger in Laminar Flow and Turbulent Flow.	08
4.	Calculation of Heat transfer Coefficient by Natural and Forced Convection.	08
5.	Heat Transfer Calculation in Plate Heat Exchanger.	08
6.	Shell and Tube Heat Exchanger.	08
7.	Heat Transfer by Radiation: Stefan-Boltzmann Law.	08
8.	Heat Transfer in Drop and Film wise Condensation Apparatus.	08

Text Book(s):

Title	Author/s	Publication
Heat Transfer Principles and Applications	K Dutta	Prentice Hall, India.
Heat Transfer	KA Gavahane	Nirali Publications.

Reference Book(s):

Title	Author/s	Publication
Heat Transfer: Principles and Applications	Dutta B. K	PHI
Heat Transfer	Chapman, A.J.	Maxwell Macmillan International Edition, 1984.

Web Material Link(s):

https://nptel.ac.in/courses/103103032/

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of performance of Practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal Viva consists of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral presentation consists of 15 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, students will be able to:

CO1	Classify and solve conduction, convection and radiation problems
CO2	Remembering the design and analyze the performance of heat exchangers.
CO3	Discriminate the design and analyze heating and cooling systems.
CO4	Validate the heat loss around various equipments.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Modes of Heat Transfer	1
2	Conduction	2,3
3	Convection	2,3,5
4	Radiation	3,4,5
5	Heat Exchanger	2,3,5
6	Boiling and condensation	3,4,5
7	Evaporators	3,4,6

P P Savani University
Institute of Diploma Studies
Department of Chemical Engineering

Course Code: IDCH2110
Course Name: Fertilizer Technology
Prerequisite Course (s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	00	02	04	40	60	00	00	20	30	150

CE: Continuous Evaluation, ESE: End Semester Exam
Objective(s) of the Course:
To help learners to

- identify different types of fertilizers and their applications for crops
- provide comprehensive and balanced understanding of essential link between chemistry and the synthetic fertilizer industry
- understand the manufacturing of fertilizers based on different nutrients

Course Content:

Section I			
Module No.	Content	Hours	Weightage in%
1.	**Overview of Fertilizers** Synthetic fertilizers, Classification of fertilizers, Role of essential Elements in plant Growth, Macro elements and Micro elements, Application of fertilizers considering Nutrient, Balance and types of crop	05	15
2.	**Nitrogenous Fertilizers** Ammonia: Physical, chemical properties and applications, Synthesis gas by Catalytic partial oxidation Steam Hydrocarbon reforming, Manufacturing of ammonia by Linde Ammonia concept process, Storage and Transportation of Ammonia, Nitric acid: Chemical, physical properties and applications, Manufacturing of Nitric Acid by Pressure ammonia oxidation process and Intermediate pressure ammonia oxidation process, Urea : Physical, chemical properties, Manufacturing of Urea by Stamicarbon's CO2 stripping process, Manufacturing of Ammonium nitrate by Prilling process.	10	30

3.	**Phosphatic Fertilizer** Physical, chemical properties and applications of Phosphorus and Phosphoric acid, Manufacturing of elemental phosphorous by Electric furnace method, Manufacturing phosphoric acid by Wet Process, Strong Sulphuric Acid Leaching Hydrochloric Acid Leaching Electric Furnace Process.	05	15
Section II			
4.	**Potassic Fertilizers** Physical, chemical properties and uses of Potassium Chloride, Potassium nitrate, Potassium sulphate, Manufacturing of potassium chloride from sylvinite, Preparation of Potassium nitrate, Potassium sulphate	05	20
5.	**Complex Fertilizer and Bio Fertilizer** Manufacturing of NPK, Ammonium Sulphate Phosphate (ASP), Calcium Ammonium Nitrate(CAN), Types of Biofertilizers, Biofertilizers Nitrogen-fixing biofertilizers Phosphate-solubilizing biofertilizers, Preparation of a biofertilizers	05	20

List of Practical:

Sr. No.	Name of Practical	Hours
1	Prepare chart for fertilizer classification with chemical formula and nutrient content	06
2	Estimate nutrient content (% N, %P_2O, % K_2O) in different fertilizers from their chemical formula	06
3	Estimate percentage of Nitrogen in Ammonium chloride by substitution method	06
4	Estimate percentage of Nitrogen in Ammonium sulfate by substitution method	06
5	Estimate percentage of Nitrogen in Ammonium chloride by back titration	06
6	Estimate percentage of Nitrogen in Ammonium sulphate by back titration	06
7	Prepare potassium sulphate	06
8	Estimate ratio from Ammonia to Phosphoric acid in DAP	06
9	Prepare bio-fertilizer	06
10	Estimate percentage of Nitrogen in DAP by Formaldehyde method	06

Text Book(s):

Title	**Author/s**	**Publication**
Dryden's Outlines of Chemical Technology	M. Gopala Rao Sitting Marshall	Affiliated East West Press (Pvt) Ltd, 3rd Ed., New Delhi
Chemical Technology -Vol. I and II, 2nd edition	Pandey G.N. and Shukla	Vani Books Company - Hyderabad
Biofertilizers in Agriculture, 2nd edition	N. S. Subba Rao	Oxford & IBH Publishing Company, New Delhi 1988

Reference Book(s):

Title	Author/s	Publication
Shreve's Chemical Process Industries, 5th edition	Austin G.T.	McGraw Hill publication, New Delhi

Web Material Link(s):

- http://nptel.ac.in/courses/103107086/4

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Tutorial/Practical:

- Continuous Evaluation consists of performance of tutorial which will be evaluated out of 10 marks for each tutorial and average of the same will be converted to 10 marks.
- Internal Viva consists of 10 marks.
- Practical performance/quiz/drawing/test of 20 marks during End Semester Exam.
- Viva/Oral presentation consists of 20 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, students will be able to:

CO1	Identify the different nutrients and significance of feed stocks for the production of fertilizers.
CO2	Classify various methods for the production of nitrogenous fertilizers.
CO3	Apply different manufacture methods for various phosphorous fertilizers.
CO4	Assess the production methods for potassium and mixed complex fertilizers.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Overview of Fertilizers	1,2
2	Nitrogenous Fertilizers	1,2,3
3	Phosphatic Fertilizer	2,3,5
4	Potassic Fertilizers	3,4,5
5	Complex Fertilizer and Bio Fertilizer	4,5,6

THIRD YEAR
DIPLOMA ENGINEERING

CONTENT

P P SAVANI UNIVERSITY															
INSTITUTE OF DIPLOMA STUDIES															
TEACHING & EXAMINATION SCHEME FOR DIPLOMA ENGINEERING PROGRAMME AY:2023-24															
Sem	Course Code	Course Title	Offered By	Teaching Scheme					Examination Scheme						
				Contact Hours				Credit	Theory		Practical		Tutorial		Total
				Theory	Practical	Tutorial	Total		CE	ESE	CE	ESE	CE	ESE	
5	IDCH3011	Mass Transfer-II	CH	2	4	0	6	4	40	60	40	60	0	0	200
	IDCH3041	Chemical Engineering Equipment Drawing	CH	2	4	0	6	4	0	0	40	60	0	0	100
	IDCH3051	Pharmaceutical Technology	CH	2	4	0	6	4	40	60	40	60	0	0	200
	IDCH3060	Computer Applications in Chemical Engineering	CH	2	4	0	6	4	0	0	40	60	0	0	100
	IDCH3070	Chemical Reaction Engineering	CH	2	4	0	6	4	40	60	40	60	0	0	200
	IDCH3910	Summer Training	CH	4			0	4	00	00	100	00	00	00	100
						Total	**30**	**24**							**900**
6	IDCH3030	Plant Design, Management & Economics	CH	3	0	0	3	3	40	60	0	0	0	0	100
	IDCH3081	Petro Chemical Technology	CH	3	4	0	7	5	40	60	40	60	0	0	200
	SEPD3020	Corporate Grooming & Etiquette	CH	1	2	0	3	2	0	0	50	50	0	0	100
	IDCH3920	Project/Training	CH	10			20	10	0	0	200	300	0	0	500
						Total	**33**	**20**							**900**

P P Savani University
Institute of Diploma Studies

Department of Chemical Engineering

Course Code: IDCH3011
Course Name: Mass Transfer-II
Prerequisite Course(s): --

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	4	0	4	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- Apply fundamentals of mass transfer and techniques involved in mass transfer operations of humidification, drying and adsorption.
- Operate and design various mass transfer equipment's.

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Distillation:** Importance of distillation as separation method, Vapor-liquid equilibrium, Relative volatility, Ideal solutions with Raoult's law, Henry's law, Flash vaporization with material balance calculation, Calculations of vapor liquid equilibrium, Differential distillation with Rayleigh's equation of simple calculation, Steam distillation, Continuous rectification – binary system based on McCabe & Thiele methods with calculation.	08	25
2.	**Humidification:** Concept of partial pressure & vapor pressure, Definitions & Simple calculations for absolute humidity, Relative saturation & percentage saturation, Concept of wet bulb temperature, Dry bulb temperature, Dew point, Humid volume, Humid heat, psychrometric chart.	07	25
Section II			
1.	**Drying:** Applications, understanding of various definitions, Types and Classification of drying operations, freeze drying, drying test and derivation of equations for drying time and simple calculations.	05	20
2.	**Adsorption and Ion Exchange:** Concept and application, types of adsorption, Hystersis,	05	15

	Characteristics and nature of adsorbents, Effect of temperature, Freundlich equation and it's applications for single stage operation, Major applications and factors affecting ion-exchange.		
3.	**Crystallization:** Concept and application, methods for supersaturation, classification of crystallizer, Meir's theory, concept of nucleation and crystal growth, effect of seeding and simple calculations for percentage yield, construction and working Vacuum crystallizer.	05	15

List of Practical

Sr No	Name of Practical/Tutorial	Hours
1	Natural draft tray dryer experiment	04
2	Spray Dryer Experiment	08
3	Fluidized bed dryer equipment	04
4	Rotary dryer equipment	08
5	Simple Distillation experiment	08
6	Steam distillation experiment	04
7	Humidification and dehumidification set-up	08
8	Solid-liquid adsorption	08
9	Crystallization experiment	08

Text Book(s):

Title	Author/s	Publication
Mass Transfer operation	R.E. Treybal	Mc-Graw Hill International Editions
Mass Transfer	Sherwood, Pigford & Wilke	Mc-Graw Hill International Editions

Reference Book(s):

Title	Author/s	Publication
Unit operations of Chemical Engg.	W.L. McCabe, J.C. Smith &Harriott	Mc-Graw Hill International Editions
Chemical Engineering	Coulson, J.M., Richardson, J.F.	Pergamon and ECBS, 1970

Web Material Link(s):

https://onlinecourses.nptel.ac.in/noc21_cy45/preview

https://nptel.ac.in/noc/courses/noc17/SEM2/noc17-cy03/

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of performance of Practical which should be evaluated out of 20 marks for each practical and average of the same will be converted to 10 marks.
- Internal Viva consists of 20 marks.
- Practical performance/quiz/drawing/test of 30 marks during End Semester Exam.
- Viva/Oral presentation consists of 30 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the students will be able to:

CO1	Understand the concept of distillation.
CO2	Analyze problems involving calculation of trays required for desired separation in binary distillation column.
CO3	Understand and evaluate the performance of various mass transfer operations like adsorption, crystallization and drying.
CO4	Learn Drying mechanism and capillary mechanism in drying operation.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Distillation	1, 2
2	Humidification	1, 2, 3
3	Drying	1, 2, 3
4	Adsorption and Ion Exchange	2, 3, 4
5	Crystallization	2, 3, 4

P P Savani University
Institute of Diploma Studies

Department of Chemical Engineering

Course Code: IDCH3041
Course Name: Chemical Engineering Equipment Drawing
Prerequisite Course(s): --

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	4	0	4	00	00	40	60	0	0	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- The student will get the idea about all equipment drawing based on different industry industry
- Sketch Chemical engineering equipments, Process flow sheets and instrument symbols and plant layouts.
- The student will get also the idea about instrumentation diagram of all equipment.

Course Content:

Section I			
Module. No.	Content	Hours	Weight age in %
1.	**Drawing the Outline of Unit Operations of all equipment by schematic representation:-** Drawing all schematic representation like batch reactor, continuous reactor, dryers, Evaporator, Extraction, Fluid handling equipment, Fluid-solid contacting equipment, Fluid-solid separation equipment, Filter press, crystallizer, cyclone separator, Filters, Fluid storage and etc.	09	15
2.	**Drawing of symbols of Chemical Engineering equipment Duration:-** Drawing of symbols for heat transfer equipment ; heat exchanger, water cooler, Steam Heater, Re-boiler and Condenser; Drawing of symbols for pumps compressors and boiler; agitator, jacketed kettle, absorber, stripper, fractionating column, pipe lines and flow meters. Drawing of symbols for instruments such as flow measurement, temperature, pressure and level.	15	20
3.	**Drawings of various Chemical Engineering equipment**	08	15

	Duration:- Draw neat sketches of 1-1 and 2-4 Shell & tube heat exchanger; Short tube vertical evaporator and Long tube forced circulation evaporator ; Rotary drum vacuum filter; Bubble cap plate; Jaw crusher; Plate & Frame filter press, Distillation column.		
Section II			
1.	**Process block diagrams/Utility diagrams / Flow diagrams using process description Duration:-** Process block diagram of some process used in industries in different ways, draw the flow diagram of the same process, Utility flow diagram (UFD) is a drawing giving information similar to PFD but about utility equipment. Here again equipment capacity, line sizes, pressure rating, control/monitoring instruments, etc. are indicated in the related drawing.	08	10
2.	**Process instrumentation diagram of equipments using different instrumentation symbols:-** Reactor temperature control; Hot fluid temperature control in heat exchanger; Spray drier temperature control; Forced circulation evaporator control with vertical heat exchanger; Control of mechanically agitated vessel used for gas absorption; Distillation column tower pressure control ; Distillation column control of level and reflux condenser with pumped reflux column ; Steam flow rate and level control of re-boiler and cooler temperature control	09	20
3.	**Process equipment layout and Project layout Duration:-** Equipment layout in Ammonia plant; water treatment plant; sugar manufacturing unit; Paper industry and cement plant Drawing of project layout for phosphoric acid, urea plant in fertilizer Industry Drawing of project layout of petroleum refinery consisting various units like CDU, FCCU, utilities etc.	11	20

Text Book(s):

Title	Author/s	Publication
Chemical Engineering drawing	R.S.Hiremath	Nirali Publications
Plant design drawing by vibrant & Dryden	Vilbrandt Frank C.	Mc Graw Hill publications
Chemical Engineering drawing	KA Ghavane	Nirali publications

Reference Book(s):

Title	Author/s	Publication
Unit Operations of Chemical Engineering	McCabe and W.L Smith V Edn	McGraw Hill

Perrys Chemical Engineers Handbook	Robert H Perry, Don W. Green	McGraw Hill

List of Practical:-

1. Student should maintain a separate A3 size sketch book which will be the part of term work and submit it along with drawing sheets. Assignment should be drawn in the sketch book as per the instruction given by subject teacher.
2. Drawing all schematic representation required in chemical industries.
3. Students should collect various process flow diagrams from nearby chemical process industries.
4. Collect different samples of pipe fittings and joints.
5. Students should collect various specification sheets for equipments from nearby chemical process industries.
6. Students should collect all piping diagram nearby industries
7. Prepare chart of piping diagram of different industries and attached in instrumentation laboratory.
8. Prepare chart for instrumentation and control attached to various equipments in institute laboratories.

Web Material Link(s):

- http://nptel.ac.in
- www.flowmaster.com
- www.vlab.co.in
- Pipeflow.co.uk

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

CO1	Draw symbols for important Chemical engineering equipments
CO2	Sketch and demonstrate equipments like heat exchangers, evaporators, jaw crusher, and filters.
CO3	Sketch and demonstrate process flow sheets for manufacture of different chemicals
CO4	Sketch, demonstrate and analyze Process instrumentation diagrams of equipments using different instrumentation symbols
CO5	Sketch and demonstrate equipment layouts and project layouts of different chemical engineering plants

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Drawing the Outline of Unit Operations of all equipment by schematic representation	1,2,6
2	Drawing of symbols of Chemical Engineering equipment Duration	1,2,4,6
3	Drawings of various Chemical Engineering equipment Duration	1,2,3,6
4	Process block diagrams/Utility diagrams / Flow diagrams using process description Duration	1,3,4,6
5	Process instrumentation diagram of equipments using different instrumentation symbols	1,2,3,6
6	Process equipment layout and Project layout Duration	1,2,4,6

P P Savani University
Institute of Diploma Studies

Department of Chemical Engineering

Course Code: IDCH3051
Course Name: Pharmaceutical Technology
Prerequisite Course(s): --

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	4	0	4	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- basic engineering principles and unit operations pertaining to pharmaceutical plants

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Materials of pharmaceutical plant construction:** Overview of composition, corrosion, properties and applications of the materials of construction with special reference to stainless steel and glass, Industrial Hazards and Safety Precautions – Mechanical, Chemical, Electrical, Fire and Dust hazards, Industrial dermatitis, Accident records, etc.	08	25
2.	**Fluid flow, heat transfer in pharmaceutical operations:** Types of flow, Concepts of boundary layer, Basic equation of fluid flow, Valves, Flow meters, Manometers and Measurement of flow and pressure, source of heat, heat transfer, steam and electricity as heating media, determination of requirement of amount of steam / electrical energy, steam pressure.	07	25
Section II			
1.	**Filtration, centrifugation and crystallization:** Theory of filtration, industrial filters including filter press, rotary press, rotary filter, edge filter, etc. Factors affecting filtration. Principles of centrifugation, industrial centrifugal filters and centrifugal sedimentary. Study of various types of crystallisers. Caking of crystals and its prevention.	05	20
2.	**Humidity control, refrigeration, and air-conditioning in pharma plants:** Basic concepts, definition, wet bulb and adiabatic saturation	05	15

	temperatures, psychometric chart and measurement of humidity, application of humidity measurement in pharmacy. Equipment for dehumidification operations, principle and applications of refrigeration and air conditioning.		
3.	**Evaporation, distillation and drying in pharma plants:** Basic concepts of phase equilibrium, factors affecting evaporation, evaporators, film evaporators, single effect and multiple effect evaporators, simple & steam flash distillation, Azeotropic and extractive distillation and Moisture content, mechanism of drying, dryers used in pharmaceutical industries, special drying methods.	05	15

List of Practical

Sr No	Name of Practical/Tutorial	Hours
1	Double Effect evaporator experiment	04
2	Spray Dryer Experiment	08
3	Plate & Frame experiment	04
4	Composite Plate heat transfer experiment	08
5	Simple Distillation experiment	08
6	Steam distillation experiment	04
7	Humidification and dehumidification set-up	08
8	Solid-liquid adsorption	08
9	Crystallization experiment	08

Text Book(s):

Title	Author/s	Publication
Unit operations of Chemical Engg.	W.L. McCabe, J.C. Smith &Harriott	Mc-Graw Hill International Editions
Transport process and separation process principles	Geankopolis, C.J	4th edition, prentice Hall of India 2005

Reference Book(s):

Title	Author/s	Publication
The Science and Practice of Pharmacy	Remington's	Mack Publishing Co. Easton
Chemical Engineering	Coulson, J.M., Richardson, J.F.	Pergamon and ECBS, 1970

Web Material Link(s):

https://onlinecourses.nptel.ac.in/noc21_cy45/preview

https://nptel.ac.in/noc/courses/noc17/SEM2/noc17-cy03/

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of performance of Practical which should be evaluated out of 20 marks for each practical and average of the same will be converted to 10 marks.
- Internal Viva consists of 20 marks.
- Practical performance/quiz/drawing/test of 30 marks during End Semester Exam.
- Viva/Oral presentation consists of 30 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the students will be able to:

CO1	Know various unit operations used in Pharmaceutical Industries.
CO2	Understand the material handling techniques.
CO3	Perform various processes involved in pharmaceutical manufacturing process
CO4	Comprehend significance of plant lay out design for optimum use of resources.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Materials of pharmaceutical plant construction	1, 2, 3
2	Fluid flow, heat transfer in pharmaceutical operations	1, 2, 3
3	Filtration, centrifugation and crystallization	1, 2, 3,6
4	Humidity control, refrigeration, and air-conditioning in pharma plants	2, 3, 4,5
5	Evaporation, distillation and drying in pharma plants	2, 3, 4

P P Savani University
Institute of Diploma Studies

Department of Chemical Engineering

Course Code: IDCH3060
Course Name: Computer Application in Chemical Engineering
Prerequisite Course(s): --

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	4	0	4	00	00	40	60	0	0	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

- Introduction of computational and numerical techniques that may be used to solve a variety of chemical engineering problems.
- Solving problems in subsequent chemical engineering using Calculator, MS excel.
- Understand and implement key numerical routines
- To create mathematical model for different reactor and equipment

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Computer and Modeling, Review of Excel** Basic of excel, Lookup & functions, Conditional formatting, Data validation, Sorting and filtering, Data analysis using tool pak, Methods for Data Analysis in Excel, Data Analysis with Microsoft Excel, Simple Linear Regression Model in Microsoft Excel	05	15
2.	**Round off and Truncation Errors** Absolute & Relative Errors, Round-off Error, Relative Approximate Error, Taylor Series, Significant digits, Floating Point Operations, Error Propagation, Numerical Cancellation	05	10
3.	**Dimensional Analysis, Optimization** Unit conversion, CGs unit , SI unit, Dimensional variable, Dimensional constant	06	15
4.	**Linear Algebraic Equations and Matrices,** Introduction to Systems of Linear Equations, Linear Systems in Two and Three Unknowns, Mathematical operations with matrices (addition,	06	10

	multiplication), Matrix inverses and determinants, Solving systems of equations with matrices		
Section II			
1.	**Drying, evaporation, distillation** Material balance without chemical reaction General balance equation, procedure for material balance calculations, yield, selectivity & conversion, application	05	10
2.	**Calculations of CSTR and PFR using MS Excel** CSTR, PFR, CSTR in series, CSTR followed by PFR PFR followed by CSTR	06	15
3.	**Material balance with and without chemical reaction** General balance equation, procedure for material balance calculations, yield, selectivity & conversion, application	06	15
4.	**Energy balance with and without chemical reaction** General balance equation, procedure for material balance calculations, yield, selectivity & conversion, application	06	10

List of Practical

Sr No	Name of Practical/Tutorial	Hours
1	Introduction to MS excel, scientific calculator	02
2	Chemical equation and stoichiometry	04
3	Drying, evaporation, distillation	04
4	Steady state reactors: To find out size of CSTR and PFR using MS Excel	04
5	Basics unit operations using MS excel	04
6	Material balance with chemical reaction	04
7	Material balance with bypass operation	04
8	Energy balance with chemical reaction	02
9	To find out the tube diameter using MS Excel in double pipe and shell and tube exchanger.	02

Text Book(s):

Title	Author/s	Publication
Introduction To Software For Chemical Engineers	Marino Martin Martin	Taylor & Francis
Applications Of Microsoft Excel In Analytical Chemistry	Stanley R. Crouch, F. James Holler	Cengagebrain

Reference Book(s):

Title	Author/s	Publication
Numerical Methods For Chemical Engineers Using Excel, Vba And Matlab	Victor J. Law	Taylor & Francis Inc
Microsoft Excel for Engineers	Delores M. Etter	Prentice Hall PTR

Web Material Link(s):

https://www.youtube.com/watch?v=0UCxrt4nI3A&list=PLGED90Y_uL1Ji9LShCQ7Z0xpl1_bxusxO&ab_channel=MohammedMohammed

https://www.youtube.com/watch?v=7-D0LZ8LwdU&list=PLbovhQcaPucXEL2x2Dej8NJj_tB5kLObT&ab_channel=TheProcessEngineer

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of performance of Practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal Viva consists of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral presentation consists of 15 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

CO1	Select a computational tool that is capable of solving a particular chemical engineering problem. Such tools include MS Excel, and Scientific Calculator.
CO2	Initiate and solve problems by numerical methods
CO3	Understand and implement key numerical routines for chemical engineering problems.
CO4	Perform statistical analysis of data.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Computer and Modeling, Review of Excel	1, 2
2	Round off and Truncation Errors	1, 2, 3
3	Dimensional Analysis, Optimization	1, 2, 3
4	Linear Algebraic Equations and Matrices,	2, 3, 4
5	Linear Regression, Nonlinear Regression, Interpolation	2, 3, 4
6	Calculations of CSTR and PFR using MS Excel	2, 3, 4
7	Material balance with and without chemical reaction	1, 2, 5
8	Energy balance with and without chemical reaction	1, 2, 5

P P Savani University
Institute of Diploma Studies

Department of Chemical Engineering

Course Code: IDCH3070
Course Name: Chemical Reaction Engineering
Prerequisite Course(s): --

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
2	4	0	4	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- To apply knowledge from calculus, differential equation, thermodynamics, general chemistry and material and energy balances to solve reactor design problems.
- To examine reaction rate data to determine rate laws and to use them to design chemical reactors.
- To accomplish the task of selecting, sizing and determining the optimal operating conditions for the reactor.

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Basics of Chemical Reactions** Scope and importance of Chemical Reaction Engineering; Chemical Kinetics; Classifications of Chemical Reaction; Basics of Reactor design; Rate of Chemical reaction- Reaction rate on various basis, Factors affecting Rate equation.	05	15
2.	**Kinetics of Homogeneous Reactions** Rate Expression; Concentration Dependent term; Rate constant; Reaction Mechanism; Elementary and Non-Elementary Reaction; Molecularity of reaction; Order of reaction; Temperature Dependent term of rate equation- Arrhenius law, Activation Energy.	05	15
3.	**Interpretation of Batch Reactor Data** Introduction; Data Collection; Method for analyzing kinetic data-Integral Method, Differential Method, Constant volume batch reactor, Integrated rate equation for different order reaction, Half-life Method.	05	20

Section II			
1.	**Ideal Reactors** Features of Ideal reactor; Different types of reactor- Batch reactor, Semi batch reactor, Flow reactors, Multiphase reactor.	05	15
2.	**Design of Single ideal Reactors** Performance design equations of ideal reactors- Batch reactor, CSTR, PFR; Space Time, Space velocity.	05	15
3.	**Design for Single Reactions** Size comparison of single reactors; Comparison of CSTR with PFR for first order reaction; CSTR in series-Unequal size, Equal size, PFR in series, PFR in parallel; Reactors of different types in series.	05	20

List of Practical

Sr No	Name of Practical/Tutorial	Hours
1	To determine the value of rate constant for the hydrolysis of ethyl acetate catalysed by hydrochloric acid.	08
2	To study the hydrolysis of ester (ethyl acetate) by alkali (NaOH).Show the reaction is kinetically second order. Also calculate the velocity constant.	08
3	To calculate value of rate constant - K for the saponification of ethyl acetate with NaOH in batch reactor-I (where M=1).	08
4	To calculate value of rate constant - K for the saponification of ethyl acetate with NaOH in TFR.	08
5	To calculate value of rate constant - K for the saponification of ethyl acetate with NaOH in Continuous Stirred Tank Reactor.	08
6	To calculate value of rate constant -K for the saponification of ethyl acetate with NaOH in packed bed reactor.	10
7	To calculate value of rate constant - K for the saponification of ethyl acetate with NaOH in CSTR in series.	10

Text Book(s):

Title	Author/s	Publication
Chemical reaction engineering	Y.O. Levenspiel	John Wiley and Sons.
Essentials of Chemical reaction engineering	H. S. Fogler	Prentice Hall International series

Reference Book(s):

Title	Author/s	Publication
The Engineering of Chemical reactions	L. D. Schmidt	Oxford University Press
Chemical Reaction Engineering-I	K. A. Gavhane	Nirali Prakashan

Web Material Link(s):
https://www.youtube.com/watch?v=DpLAsVcofao&list=PLwdnzlV3ogoUC9IWVOPTGqV5eEVNRAfGa

Course Evaluation:
Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of performance of Practical which should be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal Viva consists of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral presentation consists of 15 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

CO1	Explain basic concepts to distinguish chemical reactions.
CO2	Calculate rate, rate constant, activation energy and order of reaction.
CO3	Interpret kinetic data to find order of reactions.
CO4	Operate different reactors efficiently using basic knowledge about their functioning.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Basics of Chemical Reactions	1, 2
2	Kinetics of Homogeneous Reactions	1, 2
3	Interpretation of Batch Reactor Data	1, 2, 3
4	Ideal Reactors	2, 3, 4
5	Design of Single ideal Reactors	1, 2, 5
6	Design for Single Reactions	1, 2, 5

P P Savani University
Institute of Diploma Studies

Department of Chemical Engineering

Course Code: IDCH3030
Course Name: Plant Design, Management & Economics
Prerequisite Course(s): --

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	0	0	3	40	60	0	0	0	0	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- To understand various design and development of plant with cost calculation and analysis of profitability in chemical process industries.

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Introduction** Role of chemical engineers, Need for plant design, Process design, basic for good design	06	10
2.	**Project Development** Objective of plant Project, Process evaluation stages and their importance, Pilot plant formation, Technical factors, Economics Factors, Legal phases	06	15
3.	**Process Design** Selection of Process, Continuous v/s Batch Processing, shift and operating Schedule, Types of flow diagram, block diagram, Material and Energy Balance.	06	15
4.	**Selection Process Equipment and materials** Selection of material and process equipment, selection of pumps and dryers.	07	15
Section II			
1.	**Plant location and Layout** Factors to be considered in plant and sight location, Primary factors, Specific factors, principles of plant layout, factors methods for plant layout, unit area concept, Two-dimensional	07	15

	layout, scale models		
2.	**Economic Evaluation of Project** Capital and Fixed cost, Working capital investment, Depreciation, Methods for determining depreciation, total product cost, Utilities, maintenance and repairs cost, Net and gross earnings, Profitability analysis, Percent Return on investment, Payout time, Break Even chart, Turn Over Ratio	07	15
4.	**Optimum design** Procedure for determining optimum stage, Optimum economic design for insulation thickness, pipe diameter, Optimum Operation Design, Process Auxiliaries	07	15

Text Book(s):

Title	Author/s	Publication
Chemical Engineering Design	Gavin Towler, Ray Sinnott	Elsevier Inc.
Chemical Engg. Plant Design	Vibrant and Dryden	McGraw Hill 3rd Edition

Reference Book(s):

Title	Author/s	Publication
Plant design and Economics for Chemical Engineers	M.S. Peters and Timmerhaus.	McGraw Hill 3rd Edition

Web Material Link(s):

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course Coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

CO1	Know and understand basic economic concept and apply this concepts in the project works undertaken and to chemical engineering situation by solving problem
CO2	Know, understand and Select appropriate process for a project Differentiate the equipment and able to prepare specification sheet.
CO3	Evaluate cost including capital investment, product cost, breakeven point, depreciation cost for equipment and the total project cost and solve problem on profitability and replacement analysis

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Role of Chemical Engineers	1, 2
2	Project Development	1, 2, 3
3	Process Design	1, 2, 3
4	Selection Process Equipment and materials	2, 3, 4
5	Plant location and Layout	2, 3, 4
6	Economic Evaluation of Project	2, 3, 4
7	Optimum design	1, 2, 4

P P Savani University
Institute of Diploma Studies

Department of Chemical Engineering

Course Code: IDCH3081
Course Name: Petrochemical technology
Prerequisite Course(s): --

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
3	4	0	7	40	60	40	60	0	0	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- To operate petroleum refinery and petro-chemical plant.

Course Content:

Section I			
Module. No.	Content	Hours	Weightage in %
1.	**Basics of Petroleum** History, origin and formation of petroleum, world reserves of petroleum, Indian petroleum industries & types	02	10
2.	**Composition of petroleum** Composition of Petroleum, Classification of Petroleum, Chemistry of petroleum, Exploration & production of petroleum methods of exploration, transportation of petroleum products, Evaluation of petroleum	10	20
3.	**Properties & test methods of Petroleum** Gas, gasoline, Naphtha, kerosene, Diesel, Lube oil, Bitumen	10	20
Section II			
1.	**Petrochemicals** Definition, History & Major petrochemical products, their Producers in India & raw materials for petrochemicals	03	10

2.	**C1,C2,C3,C4 compounds** Manufacturing of important C1 compounds: Methanol, Formaldehyde; Manufacturing of important C2 compounds: Ethylene dichloride, Vinyl chloride, Ethylene Oxide; Manufacturing of important C3 compounds: Polypropylene, Propylene oxide; Chemicals from aromatics: Manufacture of Linear Alkyl Benzene, Manufacture of Phenol by benzene sulfonate process	10	20
3.	**Cracking** Introduction & definition of cracking, Chemistry & technology Catalytic cracking, Catalytic reforming, Coking Alkylation process & Isomerisation process, Polymer Gasoline Hydro cracking	10	20

List of Practical

Sr No	Name of Practical	Hours
1	Prepare a detail chart of petrochemical products	06
2	To determine the Flash point of Different types of crude oil by Penskey Martin (closed up) apparatus	06
3	To determine the Fire point of Different types of crude oil by Penskey Martin (closed up) apparatus	06
4	Measure softening point of Grease	06
5	To measure Carbon residue (Conardson method) of Different types of crude oil	06
6	To determine the Cloud & Pour point of Different types of crude oil	06
7	To measure the Penetration number of Different types of crude oil	06
8	To determine the Smoke point of Different types of crude oil	06
9	To determine the Aniline point of Different types of crude oil	06
10	Measure Viscosity of lube oil by Redwood /Saybolt/Engler viscometer	06

Text Book(s):

Title	Author/s	Publication
A Text on Petrochemicals	B.K.Bhaskar Rao	2nd Edition, Khanna Publishers, Delhi, 1998
Modern Petroleum Refining Processes	B. K.Bhaskar Rao	Oxford and IBH, 2007

Reference Book(s):

Title	Author/s	Publication
Outlines of chemical Technology	M. Gopala Rao, Marshall Sittig	3rd Edition East-West press pvt. Ltd, Delhi

Web Material Link(s):

https://nptel.ac.in/courses/103107082

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

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- Internal Viva consists of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral presentation consists of 15 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

CO1	To Design solutions for complex engineering problems and design system components or processes that meet the specified needs.
CO2	To understand about Origin formation & composition of petroleum, distillation of crude.
CO3	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues.
CO4	To know about different treatment techniques.
CO5	Create, select, and apply appropriate techniques, resources, and modern engineering.

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Basics of Petroleum	1, 2
2	Composition of petroleum	1, 2
3	Properties & test methods of Petroleum	1, 2
4	Petrochemicals	2, 3, 4
5	C1,C2,C3,C4 compounds	2, 3, 4
6	Cracking	2, 3, 4

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