

SCHOOL OF ENGINEERING

DIPLOMA

CHEMICAL ENGINEERING

SYLLABUS BOOK

AY 2024-25

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
DO 10	multidisciplinary environments.
PO 12	Life-long learning:
	Recognize the need, do necessary preparation and ability to engage in independent and life-
ĺ	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: 2024-25 Authored by: P P Savani University

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FIRST YEAR DIPLOMA ENGINEERING



1

			Р	P SAVANI I	UNIVERSITY										
			INSTI	TUTE OF D	PLOMA STUE	DIES									
TEACHING & EXAMINATION SCHEME FOR DIPLOMA ENGINEERING PROGRAMME AY:2024-25															
					Teach	ing Scheme	e			E	xami	nation	Scho	eme	
Sem.	Course Code	Course Title	Offered Bv		Contact l	Hours		Cradit	Th	eory	Prac	tical	Tutorial		Total
			_y	Theory	Practical	Tutorial	Total	creuit	CE	ESE	CE	ESE	CE	ESE	Total
	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
1	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
	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
2	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

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)						Exam	ination	Schem	ne (Marl	ks)
Theory	Dractical	Tutorial	Cradit	Tł	neory	Pra	actical	Τu	itorial	Total
Theory	Flattital	Tutorial	Cieuit	CE	ESE	CE	ESE	CE	ESE	TOtal
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.

Section I							
Module No.	Content	Hours	Weightage in %				
1	Logarithm	F	14				
1.	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 - 3 rd 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	Н К Басс	H K Dass	
Polytechnics - 10 th Edition	11. K. Dass	11. 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:

C01	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

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)				Ex	aminatio	on Schem	e (Marks	5)		
Theory	Dractical	Tutorial	Tutorial Cradit		ory	Pra	ctical	Tut	orial	Total
Theory	Flactical	Tutoriai	Cleuit	CE	ESE	CE	ESE	CE	ESE	TOLAI
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.

	Section I				
Module No	Content	Hours	Weightag e		
110.			in %		
	SI Units & Measurements:				
	Need of measurement and unit in engineering and science,				
	Definition of unit and requirements of standard unit, Systems of				
1	units- CGS, MKS and SI, Fundamental and Derived quantities and	F	10		
1.	their units, Least count and range of instrument, Vernier caliper,	5	10		
	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				
	Motion in a Plane:				
	Scalar and vector quantities, Position and displacement vectors,				
	General vectors and their notations, Equality of vectors,				
2	multiplication of vectors by a real number, Addition and subtraction	6	1 🗖		
Ζ.	of vectors, Relative velocity, Unit vector, Resolution of a vector in a	0	15		
	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				

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	, l ,	10
	Section II	1	
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 (not 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 HeatTransmission of heat - Conduction, Convection and Radiation, Goodand bad conductor of heat with examples, Law of thermalconductivity, Coefficient of thermal conductivity and its S.I. unitHeat capacity and Specific heat of materials, Celsius, Fahrenheit andKelvin temperature scales and their conversion formula	, l l 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 wavemotion, Displacement relation for a progressive wave, Principle ofsuperposition of waves, Reflection of waves, Sanding waves instrings and organ pipes, Fundamental mode and harmonics, Beats,Doppler effect	f 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:

1	
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

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)					Examir	nation Se	cheme (Marks)		
Theory	Dractical	Tutorial	Crodit	Th	neory	Pra	ictical	Tu	torial	Total
Theory	Flattital	Tutorial	Cleuit	CE	ESE	CE	ESE	CE	ESE	TOtal
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

Section I					
Module	Contont	Hours	Weightage		
No.	Content	HOUIS	in %		
	Introduction of Mechanical Engineering:				
1	Introduction, Scope, Importance, Basic terminologies in	02	7		
1.	mechanical engineering, Basic mechanical components used	02	/		
	in routine, Pipe and				
	pipe fittings, Hand tools, Power tools				
	Heat interactive equipment:				
	Heat transfer and its Modes, Boilers, Classification and				
2.	Working, Concept of Accessories and Mountings - Types,				
	Applications, Primemovers, Meaning, Classification, Steam	04	12		
	turbine working, Layout of thermal power plant, Working and	04	15		
	applications, Internal combustion engines – Definition,				
	Classification, Components, Working of two-stroke				
	and four-stroke				
	engines, S.I. and C.I. engines				

	Power Transmission and Safety:				
2	Power transmission: Importance, Modes,	02	10		
5.	Applications, Couplings in power transmission, Safety	05	10		
4	Hydraulic and pneumatic devices:	03	10		
1.	Concept of theory of fluid flow, general properties of fluid flow,	05	10		
	Pumps,				
	Water turbines, and Air compressors – working principle,				
	types, parts,				
	Manufacturing processes:				
	Overview of manufacturing processes. Welding concept and				
5	overview Types Arc and Gas welding Accessories and	03	10		
5.	Consumables. Precautions and Safety during arc and gas	00	10		
	welding. Casting - Introduction.				
	Applications.				
Section II					
	Civil Engineering: An Overview				
6.	Introduction, Branches, Scope, Impact, Role of Civil Engineer,	02	7		
	Unit of measurement, Unit conversion (Length, Area, Volume).				
	Civil Engineering Surveying:				
	Surveying & leveling (its importance and types), Necessity for				
7.	leveling, Principals of surveying, Instrument/tools used for	05	17		
	survey and level, Various methods of finding the field survey				
	measurements, Chain and				
	Compass Survey				
	Civil Engineering Drawing:				
8	Types of building drawings, Abbreviation, conventions &	04	13		
	symbols in civil drawing, building byelaws for planning of				
	residential building and industrial building, Planning of simple				
	residential and industrial building				
	Construction Materials:				
0	Common construction materials such as cement, Brick, Stone,	0.4	10		
9.	inducer, steel and Concrete, Properties of each materials & their	04	13		
	acceptable standards, Quality parameters of materials,				
	simple structure (only the material cost)				
	simple su ucture (only the material cost)				

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			
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.

|--|

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

Institute of Diploma Studies

Department of Computer Engineering

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

Teaching & Examination Scheme:

Teaching Scheme(Hours/Week)						Examin	ation S	cheme(Marks)	
Theory	Dractical	tical Tutorial	Credit		Theory Practical		Tutorial		Total	
Theory	Flattital			CE	ESE	CE	ESE	CE	ESE	TOLAT
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.

	Section I		
Module	Content	Hours	Weightage
No.	Goment	110ur3	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

	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		
2.	Sharing OS Foatures of DOS Windows and UNIX	08	15
	Descrementar Languages Compiler Internetor Computer		
	View Different Transformer from the Detection of		
	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.		
3.	Using MS-Word	07	15
	Use basics text formatting features, manipulate text, use		
	page		
	Setup features, use spen 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		
	Using MS-Excel		
4.	Use basic formatting and data entry features, use formula	07	20
	and functions, Work with graphics, Create and manipulate	07	
	charts, Use header and footer options, Setup page layout		
	and print worksheet		
	Using MS - PowerPoint		
	Create new presentation and apply basic formatting		
5.	features, use master slide, Create and manipulate table,	07	15
	Work with objects and clips, Work with video, Work with		
	audio, use special effects, Use		
	navigation and hyper linking, Custom Animation and		
	Transitions		
	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,		
6	Surfing the Internet, Chatting on Internet, Basic of	08	15
0.	electronic mail, Using Emails, Document handling,	00	10
	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		

List of Practical(s):

Si No List of Fractical 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:	04
	WinZip, Defragmenting Hard, Formatting Hard disk, etc.	
	Use accessories utilities of windows OS the User Interface, Using Mouse	
	and Moving Icons on the screen, The My Computer Icon, The Recycle	
3.	Bin, Status Bar, Start and Menu & Menu-selection, Running an	02
	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.	
4	Entering and editing text in document life. Apply formatting features on	0.4
4.	Text like Bold, Italics, Underline, font type, color and size, Apply	04
	features like bullet,	
	numbering in Microsoft word.	
5	tables Smart art Chart in Microsoft word Insort Hymorlink, Page number	04
5.	and textbox in	04
	and textbox in	
6	Create Event Registration Form and Resume in Microsoft word	04
0.	Entering and editing data in worksheet Fill Series fill with	01
7.	formatting and	02
	without formatting Using Microsoft Excel.	
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	02
	conditions,	
	Freeze row & Column in Microsoft Excel.	
10	Create Mark sheet, and Pay slips using Excel, Apply various	06
10.	formula and	00
	functions in the sheet.	
11.	Print sheet using print area, Page setting, print titles, Adjusting	02
	head head are and factors	
	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 &	
12	Transition Apply basic formatting features in presentation like font	16
	font size font color text fill spacing and line spacing Formatting text	10
	hoxes word arts styles bullet and numbering in Microsoft power point.	
	Working with drawing tools applying shape or nicture	
	styles Applying object horders object fill object effects in Microsoft Power	
	point.	
13.	Working with video, Link to video and sound files using power point.	02
	Internet Searching, Browsers, Various functions of Browsers (Eg.	
14.	Bookmark, Customize Settings), Study of components like switches,	02
	bridges, routers, Wi-Fi	
	router,	

15.	Introduction of Google application, Compose Gmail, File attachment, add signature.	02
16.	Demonstration of Google drive, Sharing File Using Google drive, Spreadsheet,	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:

Theer the con	ipretion of the course, statemes 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	2,3,5
	Applications	

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	Dractical	Tutorial	Crodit	Th	leory	Pra	actical	Tu	torial	Total
Theory	Flattical	Tutoriai	creuit	CE	ESE	CE	ESE	CE	ESE	TOLAT
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.

Section I					
Module No.	lle Content				
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		
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 &
workshop recimology-r	fiazra anu chaudhary	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	2,4
	Norms and Various Shops	
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

Institute of Diploma Studies

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

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)						Examin	ation Sc	heme (Marks)	
Theory Practical Tutorial Cradit		Th	eory	Pra	ctical	Tu	torial	Total		
Theory	Tactical	Tutoriai	cicuit	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

- 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.

Section I					
Module No.	Content	Hours	Weightage in %		
	Parts of Speech – I				
1.	• Verb	05	12		
	 Pronoun (personal, possessive) Adverbs 				
	Adjectives				
	Parts of Speech – II				
	 Use of Prepositions of time and place 				
2	Conjunctions	05	13		
2.	Interjections	05	15		
	• Articles 'A, An, and The'				
	 Indicators- this, that, these, those 				

	Tenses		
	Present and past simple form of		
2	'to be' – am/is/are/was/were	06	25
э.	Present Tense (all forms)	00	23
	Past Tense (all forms)		
	Future Tense (all forms)		
	Section II		
	Vocabulary		
1	Basic Vocabulary	02	12
1.	Academic Vocabulary	03	12
	• Jargons		
	Auxiliary Verb		
2.	 So, neither-nor, either-or 	03	13
	 Shall, should, can, could, may, might, must 		
	Types of Sentences		
	 Simple, Compound, and Complex sentences 		
	 Practice of Assertive, Negative, Interrogative, 		
	Exclamatory Sentences		
3.	Question Tag	08	25
	'WH' Questions		
	 'How much' & 'How Many' 		
	Reported Speech		
	Active-Passive voice		

Text Book (s):

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

Reference Book (s):

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

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)				E	xamina	ation Sc	heme(Marks)		
Theory Practical	Tutorial	Credit	Th	eory	Pra	ctical	Tu	torial	Total	
Theory	Flattital	Tutorial	creuit	CE	ESE	CE	ESE	CE	ESE	TOLAI
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.

	Section I			
Module	Content	Hours	Weightage	
INU.	Function cond Limite		11170	
1.	Introduction, Function, Types of function, Classification of function,	5	14	
	Limit of a function, Properties of limit, Standard limits, limit of trigonometric functions.			
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. Differen	ntial 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.		
	Complex Number		
5.	Introduction, Mathematical Operations, Polar form, Modulus,	6	18
	Amplitude Farm, De Movire's Theorem.		
	Statistics		
	Introduction, Central tendency, Mean, Mean of discrete		
6.	observations, Mean of grouped data, Step deviation method,	7	14
	Median, Median for grouped data, Mode, Standard deviation,		
	Standard deviation for		
	Grouped data.		

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	Dr. N. R. Pandya	Macmillan Publication
Polytechnic		
Engineering Mathematics-3 rd Edition	Anthonycroft & others	Pearson Education Publication

Reference Book:

Title	Author(s)	Publication
Applied Mathematics for	H K Dass	H K Dass
Polytechnics-10 th Edition	II.R.Dass	II.R.Dass
Applied Mathematics	W.R.Neelkanth	SapnaPublication

Polytechnic Mathematics	DeshnandeSP	PuneVidyarthiGruh
i olyteennie Mathematics	Destipandest	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:

	· · · · · · · · · · · · · · · · · · ·
C01	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	Tutorial	Cradit	Theory		Practical		Tutorial		Total	
	Flattital	actical I utorial	Clean	CE	ESE	CE	ESE	CE	ESE	TOLAI
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.

Section I						
Module.	Content	Hours	Weightage			
No.			in %			
	Atomic Structure, Molecular Mass, Acids and Bases					
	Atom Definition Fundamental particles of Atom their Mass,					
1.	Charge and Location. Atomic number and Mass number,	05	15			
	Definition Isotopes and Isobars with suitable examples.					
	Formation of cation and anion					
	by electronic concept of oxidation and reduction.					
2.	Molecular Mass					
	Molecule, Molecular Formula, Molecular Mass, Mole, Definition	05	10			
	Simple calculations. Avogadro's Hypothesis - Relationship					
	between Molecular Mass and vapour Density, Avogadro					
	Number.					
	Chemical Bonding and Structure of Molecules					
3.	Chemical Bond, Valence, Valence Electrons, Bonding and Non					
	Bonding Electrons, Lewis Symbols, Octet Rule. Definition,	06	15			
	Condition for Formation of Ionic Bond, Factors Governing	00	15			
	Formation of Ionic Bond, Metallic Bond, Covalent Bond and Co-					
	ordinate Covalent Bond:					
	Hydrogen Bonding,					

	Acids and Bases		
4.	Theories of Acids and Bases, Arrhenius Theory, Lowry -		10
	Bronsted Theory, Lewis Theory, Advantages of Lewis Theory,	06	10
	pH and pOH Definition, Numerical problems, Indicator,		
	Definition and Examples,		
	Buffer solution, Definition, Types of buffer solution with		
	examples,		
	Application of pH in Industries.		
	Section II		
	Solutions		
1.	Definition, Methods of expressing concentration of a	05	10
	solution		
	Molarity, Molality, Normality, Mole fraction and Percentage		
	Mass – Simple problems.		
	True solution and Colloidal solution Definition Differences		
	Types of colloids – Lyonhilic and Lyonhobic colloids		
2	Differences Properties Tyndall effect Brownian movement	06	15
2.	Flectronhoresis and Coagulation Industrial applications of	00	15
	colloids Smoke Precipitation by Cottrell's method Purification		
	of water Cleansing action of soan		
	Tanning of leather and Sewage disposal		
	Electrochemistry		
	Electrolyte definition, Strong and Weak electrolytes, Examples.		
	Electrolysis definition, Mechanism, Industrial application of		
3.	Electrolysis, Electroplating, Preparation of surface, Process	06	15
	Factors affecting the stability of the coating, Chrome plating,		
	Electroless plating definition, Advantages of		
	Electroless plating over		
	electroplating , Applications of Electroless plating.		
	Electrochemical-Cell		
4	Electrochemical Cell definition, Representation of a Cell, Single		
	Electrode Potential definition, Galvanic Cell, Formation of	06	10
т.	Daniel Cell, Electrochemical Series, Definition and Significance,		
	Electrolytic Concentration Cell definition and Formation.		

List of Practical

Sr No	Name of Practical/Tutorial	Hours
1.	Using a chemical balance.	02
2.	Introduction to chemistry laboratory – Molarity, Normality, Primary,	04
	Secondary standard solutions, Volumetric titrations, Quantitative analysis,	
	Quantitative analysis	
	etc.	
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	04
----	--	----
	against standard solution of Oxalic acid.	
7.	Determination of strength of a given solution of Hydrochloric acid by titrating it	04
	against standard Sodium Carbonate solution.	
8.	Determination of temporary and permanent hardness in water sample using EDTA	02
	as standard solution.	
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	R. Gopalan, D. Venkappaya,	Vikas Publishing house Ltd.
Engineering	Nagarajan	
Chemistry (4th Edition)		

Web Material Link(s):

https://onlinecourses.nptel.ac.in/noc21_cy45/pr eview https://nptel.ac.in/noc/courses/noc17/SEM2/n oc17-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:
C01	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

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

Department of Civil Engineering

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

Teaching & Examination Scheme:

Teaching Scheme(Hours/Week)				E	xamina	tion Sch	eme(M	arks)		
Theory	Practical	Tutorial	Credit	Th	eory	Pra	ctical	Tut	orial	Total
Theory	Flattital	Tutoriai	Creuit	CE	ESE	CE	ESE	CE	ESE	TOLAT
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.

	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, Resultant of coplanar force system., Equilibrium of coplanar force system, 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		

	Friction:		
4.	Introduction, Wet and Dry friction, Theory of Dry friction,	07	15
	Angle of friction, Angle of Repose, Cone of friction, Coulomb's		
	laws of friction.		
	Centre of Gravity:		
5.	Center of Gravity, Center of Mass and Centroid of curves, areas,	09	15
	volumes, Determination of centroid by integration, Centroid of		
	Composite bodies.		
	Moment of Inertia:		
	Definition of Moment of inertia of area, Perpendicular axis		
<i>.</i>	theorem and Polar moment of Inertia, Parallelax istheorem,	00	0.0
6.	Moment of inertia of simple areas by integration, Moment of	09	20
	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		

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 and 1 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.

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

Department of IT Engineering

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

Teaching & Examination Scheme:

Teaching Scheme(Hours/Week)					Ех	kaminati	on Sche	eme(Mai	rks)		
Theory	Theory Practical Tutorial	Tutorial	Tutorial Cradit	Tutorial Cradit	1	Theory	P	ractical	Т	utorial	Total
Theory		Creuit	CE	ESE	CE	ESE	CE	ESE	TOLAI		
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.
- ?

	Section I						
Module No.	Content	Hours	Weightage in%				
1.	Introduction to Programming Language Classification of Programming Languages, Generations of Programming	04	10				
	Languages-Machine Language, Assembly Language, High-Level Language, 4GL.						
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	08	18				
	Initialization, User Define Type Declarations –Type of Enum, Basic Input, and Output Operations, Symbolic Constants, Overflow and Under flow of Data.						

	Operators, Expressions, and Managing I/O Operations:			
2	Introduction to Operators and its Types, Evaluation of Expressions, Precedence of Arithmetic	06	15	
5.	Output.	00	15	
	Section II			
	Conditional Statements:			
	Decision Making & Branching: Decision Making with If and If -			
4.	else Statements, Nesting of If-else Statements, The Switch and	07	15	
	go-to statements, Ternary (?:) Operator. Looping: The while			
	Statement, The Break Statement & The Do. While loop, The			
	FOR loop, Jump			
	Within loops-Programs.			
_	Arrays:			
5.	Introduction, One-dimensional Arrays, Two-dimensional Arrays,	07	14	
	Concept of Multidimensional Arrays.			
	Strings:			
6.	Declaring and Initializing String Variables, Arithmetic	06	14	
	Operations on			
	Characters, Putting Strings Together, Comparison of Two			
	Strings, String Handling Functions.			
7	Concents of laser defined Functions. Destatement function	07	14	
/.	Concepts of Oser-defined Functions, Protocypes, function	07	11	
	Pocursivo			
	Function Macros and Macro Substitution			
	דינווכנוסוו, שומכו טל מווע שומכו ט לעטלוונענוסוו			

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"	
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	10
	Statement ,switch statement, break statement, go to statement)	
4.	Working with C looping constructs (for loop, while loop, do-while and nested	10
	For loop)	
5.	Working with the array in C(1-Darray, and 2-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	08
	type,	
	Function with/without argument, function and array)	
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	Poorson Education		
individuction to computer science	Limited	real Soli Euucation		

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 and 1 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.

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

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)				E	Ixamina	ation Scł	neme(M	larks)		
Theory Practica	Drug atting l	l Tutorial	Cradit	Th	Theory		ctical	Tutorial		Total
	Plactical		Crean	CE	ESE	CE	ESE	CE	ESE	Total
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.

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

Course Code: CFLS1040

Course Name: Functional English-II

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

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)					E	xamina	tion Sch	eme (M	larks)		
Theory Dreatical		There	The state	orial Cradit		Theory	P	ractical	Τι	ıtorial	Tatal
Theory	Theory Practical Tutorial C	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.	ReadingReading 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	Parul Popat &Kaushal Kotadia	Pearson, 2015

Reference Book (s):

Title	Author/s	Publication
Communication Skills, Second	<u>Sanjay Kumar, PushpLata</u>	Oxford University
Edition		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.

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



	P P SAVANI UNIVERSITY														
	INSTITUTE OF DIPLOMA STUDIES														
	TEACHING & EXAMINATION SCHEME FOR DIPLOMA ENGINEERING PROGRAMME AY:2024-25														
					Teachin	g Schen	ıe		Examination Scheme					1	
Sem	Course Code	Course Title	Offered		Conta	ct Hour	S		Th	eory	Pra	ctical	Tu	itorial	_
			Бу	Theory	Practical	Tutorial	Total	Cred it	CE	ESE	CE	ESE	CE	ESE	Total
	IDCH2010	Fluid Flow Operation	СН	2	4	0	6	4	40	60	40	60	00	00	200
	IDCH2021	Industrial Stoichiometry	СН	2	0	2	4	4	40	60	00	00	00	00	150
	IDCH2030	Chemical Process Technology	СН	2	4	0	6	4	40	60	40	60	00	00	200
3	IDCH2040	Industrial Safety & Environmental Engineering	СН	1	0	0	1	1	50	00	00	00	00	00	50
5	IDCH2050	Chemical Engineering Thermodynamics	СН	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
	IDCH2060	Mass Transfer-I	СН	2	4	0	6	4	40	60	40	60	00	00	200
	IDCH2070	Instrumentation	СН	2	4	0	6	4	40	60	40	60	00	00	200
	IDCH2081	Plant Utilities & Energy Engineering	СН	2	0	0	2	2	40	60	00	00	00	00	100
	IDCH2090	Mechanical Operation	СН	2	4	0	6	4	40	60	40	60	00	00	200
4	IDCH2100	Process Heat Transfer	СН	2	4	0	6	4	40	60	40	60	00	00	200
	IDCH2110	Fertilizer Technology	СН	2	0	2	6	4	40	60	00	00	20	30	150
						Total	26	22							1050

Department of Chemical Engineering

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

Teaching Scheme (Hours/Week)				Ι	Examina	ation Scl	heme (N	/larks)		
Theory	Practical	Tutorial	Crodit	Th	eory	Pra	ctical	Tut	orial	Total
Theory	FIACULAI	Tutoriai	Credit	CE	ESE	CE	ESE	CE	ESE	TOLAI
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

Section I					
Module.	Content	Hours	Weightage		
No.			in %		
	Introduction to fluids				
	Properties of fluids- Density and viscosity (absolute and				
	kinematic), Vapour pressure and surface tension, cohesion				
1.	Manometers- Types of Manometers (II. Inclined	05	15		
	Differential), Equations, Uses Types of Fluids- Ideal and				
	Actual fluids, Compressible and Incompressible Fluids,				
	Newtonian and Non-Newtonian fluids				
	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				
2.	volumetric flow rate average velocity and mass velocity	05	20		
	Bernoulli's Theorem by Fuler's equation and its application				
	Bernoulli's equation for ideal fluid, actual fluid and with				
	pump work done.				
	Correction in Bernoulli's equation.				
	Section II				

	Measurement of flow		
	Measurement of fluid flow with the help of flow meters-		
	Venturimeter: Construction Principle, Working, Coefficient of		
	discharge, Calibration, Derivation, Orifice meter:		
2	Construction, principle, Working, Coefficient of discharge,	05	1 Г
3.	Calibration, Derivation for calculating the flow rates, Rota	05	15
	meter: construction, principle working and Calibration, Pitot		
	tube: Construction, Principle and Working. Nozzle meter:		
	construction, principal working, derivation for calculating		
	flow		
	rates.		

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

List of Practical

Sr No	Name of Practical/Tutorial	Hours
10.	Determination of coefficient of discharge of venture meter and plot a	02
11.	Determination of coefficient of discharge of orifice meter & plot a calibration	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	08
	summation	
	of pressure head, kinetic head and potential head is constant.	
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	08
	Redwood	
	Viscometer)	
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:

C01	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.				

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

Department of Chemical Engineering

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

Teaching Scheme (Hours/Week)				l	Examin	ation Sc	heme (N	Marks)		
Theory Dractical T		l Tutorial Credit		Th	eory	Pra	ctical	Tut	torial	Total
Theory	Flattital	Tutoriai	Cleuit	CE	ESE	CE	ESE	CE	ESE	TOLAI
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

Section I					
Module.	Content	Hours	Weightage		
No.			in %		
	Unit Systems:				
	Introduction to process calculation, dimensions and systems				
1.	of units, fundamental quantities of units, derived quantities,	03	10		
	definition and units of force, volume, pressure, work,				
	energy,				
	power, heat, unit conversions in FPS, MKS and SI systems				
	Basic Chemical Calculations:				
	Definition and calculations of mole, atomic weight, molecular				
2.	weight, equivalent weight, specific gravity and API gravity.	04	15		
	Composition of solid, liquid by weight % and mole %,				
	morality,				
	normality, morality, gm/lit.				
	Ideal gas law:				
	Concept of ideal gas, derivation of ideal gas law, definition of				
3.	STP and NTP, Dalton's law and Amagat's law, derive relation	03	15		
	between mole%, volume% and pressure% of ideal gases,	05	15		
	calculation of average molecular weight, density, mole%,				
	weight				
	% in gas mixture in SI/MKS systems.				
	Section II				

	Material Balance in Processes Without Chemical		
	Reactions: Law of conversation of mass, brief description		
4	and simple material balance calculation of drying,	06	15
1.	distillation, absorption, mixing, crystallization, evaporation,	00	15
	single stage material balance calculation of leaching		
	and extraction, brief idea		
	regarding recycling and by-passing operation.		
5.	Material Balance in Processes Involving	05	15
	Chemical		
	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.		
	Energy Balance:		
	Heat capacity and specific heat, mean heat capacity of gases,		
	heat capacity of gas mixture and liquid mixture, calculations		
6.	of heat capacity by integral equation up to three terms, brief	05	20
0.	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		
	Combustion:		
	Introduction of combustion, types of fuels, calorific values of		
7.	fuels, proximate and ultimate analysis of solid fuel,	04	10
	numerical related to calorific values of fuel from		
	composition, numerical related to air, requirement and		
	composition of flue gases.		

Text Book(s):

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

Reference Book(s):

Title	Author/s	Publication
Introduction to Process	Gavhane K. A.	Nirali
Calculations		Prakasha
Stoichiometry		n,
		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:

C01	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.

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	2,3,5
	Chemical	
	Reactions	
5	Material Balance in Processes Involving	2,3,5
	Chemical Reactions	
6	Energy Balance	4,5
7	Combustion	5,6

Department of Chemical Engineering

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

Teaching Scheme (Hours/Week)]	Examin	ation Sc	heme (N	Aarks)		
Theory	Practical Tutorial	ractical Tutorial	Credit	Th	Theory		ctical	Tutorial		Total
Theory			Tutoriai	Credit	Credit	CE	ESE	CE	ESE	CE
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

Section I						
Module.	Content	Hours	Weightage			
No.			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:

	1 /
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

Γ

1: Remember 2: Understand		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

Department of Chemical Engineering

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

Teaching Scheme (Hours/Week)]	Examin	ation Sc	heme (N	Marks)			
Theory Practical Tutorial		Cradit	Th	eory	Pra	ctical	Tut	torial	Total	
Theory	Tactical	Tutoriai	cieuit	CE	ESE	CE	ESE	CE	ESE	Total
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.

Section I					
Module.	Content	Hours	Weightage		
No.			in %		
	General Introduction & Concept of Safety:				
1.	Safety of organization, Safety measures Concept & Importance	01	10		
	of safety in chemical industries.				
	Chemical & Fire Hazards & their Control:				
	Definition, sources & classification of hazards like chemical,				
2.	fire, Different methods for controlling chemical & fire	04	25		
	hazards, Objective & importance of fire prevention, fire				
	extinguishing agents & devices with their working.				
	Personal Protective Devices:				
3.	Protective devices for head, ears, eyes, face, respiratory	01	10		
	system, hand, feet etc.				
	Section II				
	Introduction to pollution:				
Д	Introduction to environmental pollution, sources of	02	15		
1.	pollutants,	02	15		
	effects of pollution on human health, vegetation, animal life				
	& effect on environment.				
	Air Pollution:				
_	Sources & Types of air pollutant, classification, properties of		2.2		
5.	air pollutant, effect of air pollution, Air pollution control	03	20		
	methods like gravitational settling, Diffusion, Electrostatic				
	precipitation,				
	Centrifugal impaction, Direct interception etc.				

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:

C01	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

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

Department of Chemical Engineering

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

Teaching Scheme (Hours/Week)				I	Examin	ation Sc	heme (N	/arks)		
Theory Drastical	Practical	tical Tutorial	Cradit	Theory		Practical		Tut	torial	Total
Theory	Tactical	Tutoriai	cieuit	CE	ESE	CE	ESE	CE	ESE	Total
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.

Section I							
Module.	Content	Hours	Weightage				
No.			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	08	15				

	Thermodynamics					
Section II						
4.	Entropy	06	15			
	Inequality of Classius, entropy-a property of a system entropy					
	change in reversible process, entropy change for an open					
	system, principle of increase of entropy, efficiency, irreversibility.					
	Applications of Second law of Thermodynamics Refrigeration,					
	refrigeration cycle, types of compressors, reciprocating air					
	compressor, single stage compressor, and isentropic efficiency					
	of compressor, coefficient of performance(COP), liquefaction					
5.	applications.	07	15			
	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					
6	bubble point, calculations for two component systems, fugacity,	08	20			
0.	fugacity, fugacity coefficient, activity and activity coefficient.	00	20			

Text Book(s):

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

Reference Book(s):

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

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:

C01	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.

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	1,2,3
	Closed System	
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	2,3,5,6
	Liquid Equilibrium	

Department of Mechanical Engineering

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

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Ex	aminat	ion Sche	eme (Ma	ırks)			
			Due ation Trutanial	Creadit	The	eory	Pra	ctical	Tut	orial	Tatal
Theory	Practical	Tutorial	Credit	CE	ESE	CE	ESE	CE	ESE	Total	
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.

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			
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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			

Sr No	Name of Practical	Hours
1	Letters and numbers, Dimensioning techniques, Scale (reduced, enlarged &	02
1.	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	P J Shah	S. Chand & Company Ltd.,
Engineering		New Delhi
Graphics		
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):

• <u>http://nptel.ac.in/courses/105104148/</u>

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:

C01	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.

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

Department of Chemical Engineering

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

Teaching Scheme (Hours/Week)					l	Examina	ation Sc	heme (N	/larks)	
Theory	Practical	Tutorial	Credit	Th	eory	Pra	ctical	Tut	torial	Total
THEOTY	Tactical	Tutoriai	Creuit	CE	ESE	CE	ESE	CE	ESE	Total
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.

Section I					
Module.	Content	Hours	Weightage		
No.			in %		
	Introduction:				
1	Importance of mass transfer operations, classification of	02	10		
1.	mass- transfer operations, methods of conducting mass	02	10		
	transfer operations and fundamental design principles.				
	Molecular Diffusion Of Fluids:				
	Concept of molecular and eddy diffusion, Fick's law for				
2.	diffusion, general equation for steady-state molecular	05	15		
	diffusion in fluid within laminar flow, thermal diffusion,				
	simple problems on				
	diffusion by direct use of formula.				
	Inter phase Mass Transfer:				
	Concept of equilibrium, local and average overall mass				
3.	transfer coefficient, film theory, penetration theory, analogy	05	20		
	between mass and momentum transfer and concept of				
	stage, stage				
	efficiency, cascade etc.				
	Section II				

	Gas Absorption:		
4.	solubility of gases in liquids, effect of temperature and pressure on solubility, characteristics of ideal liquid solutions of Raoult's	06	20
	component		
	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

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	08
	an	
	organic vapor (i.e. CCl4) in air.	
3.	Liquid – Liquid Diffusion - To study the effect of temperature on	08
	the	
	diffusion coefficient.	
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	Perry & Green	Mc-Graw Hill International Editions
Handbook		
Chemical Engineering	Coulson, J.M., Richardson, J.F.	Pergamon and ECBS, 1970
Unit operations of	W.L. McCabe, J.C. Smith	Mc-Graw Hill International Editions
Chemical Engg.	&Harriott	

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:

C01	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.

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

Department of Chemical Engineering

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

Teaching Scheme (Hours/Week)				l	Examina	ation Sc	heme (N	/larks)		
Theory Dractical		Tutorial Cradit		Th	eory	Pra	ctical	Tut	torial	Total
Theory	Flattital	Tutoriai	creuit	CE	ESE	CE	ESE	CE	ESE	Total
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.

	Section I		
Module.	Content	Hours	Weightage
No.			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, thermocouple 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

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 &	S. K. Singh	McGraw Hill Education India, 1987
Control		

Reference Book(s):

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

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:

	······································
C01	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.
I amal of F	Deem's Devised Disem's Town on win Assessment

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	

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)]	Examin	ation Sc	heme (N	Marks)			
Theory	Dractical Tutorial Credit		Practical Tutorial Cradit		Th	eory	Pra	ctical	Tut	torial	Total
Theory	Tactical	Tutoriai	Cleun	CE	ESE	CE	ESE	CE	ESE	Total	
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.

	Section I							
Module.	Content	Hours	Weightage					
No.			in %					
	Introduction:							
1	Types of energy, energy crisis, Renewable sources of	02	10					
1.	energy,	02	10					
	conventional & Non-Conventional sources of energy,							
	energy conservation.							
	Conventional fuels:							
	Classification, types, sources, properties, uses, storage,							
	handling & selection factors of various conventional fuels in							
2.	the form of	06	20					
	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							

	Non-conventional sources of energy:		
	Solar energy : Solar radiation, collectors, storage &		
	applications Wind energy : Introduction, nature of wind &		
3.	wind farm Biomass energy : Introduction, Biomass	07	20
	conversion technology by wet & Dry process		
	Geothermal energy: Introduction & Sources of		
	geothermal		
	energy.		
	Nuclear energy : Introduction, Nuclear Fuels &		
	Nuclear		
	reactions, types of Propellant & moderators		
	Section II		
	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		. .
4.	water by screening, sedimentation, coagulation, filtration &	08	25
	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.		
	Air & Refrigeration:		
	Introduction, use of air as chemical raw material & utility,		
	concept of compressed air, blower air, fan air, instrument air		
5.	etc., various methods of refrigeration in brief like ice,	07	25
	evaporate, vapor, steam jet refrigeration etc, types of		
	refrigerating agent like ammonia, carbon dioxide,		
	methylene chloride, water brine		
	etc., selection of refrigerating agents.		

Text Book(s):

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

Reference Book(s):

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

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:

C01	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.
C04	Acquire an overview of key selection considerations of plant utilities.

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

Department of Chemical Engineering

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

Teaching & Examination Scheme:

Teaching Scheme(Hours/Week)				Exa	minati	on Scher	ne(Mar	ks)				
Theory	y Drastical Tytorial		Dractical Tutorial		wiel Credit		eory	Prac	ctical	Tute	orial	Total
Theory	FIACULAI	TULOTIAI	Credit	CE	ESE	CE	ESE	CE	ESE	TOLAI		
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

Section I						
			_			
Module	Content	Hours	Weightage			
No.	Gontein	nours	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

Sr. No.	Name of Practical	Hours
1	Measure volume surface mean diameter, mass mean diameter, number	06
	of	
	particles using sieve shaker	
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	W L McCabe and J C Smith	McGraw-Hill International
Engineering		
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):

• <u>http://nptel.ac.in/syllabus/103107091</u>

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:

	1
C01	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.

		5	
1: Remember2: Understand3: Apply	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

Department of Chemical Engineering

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

Teaching Scheme (Hours/Week)]	Examin	ation Sc	heme (N	Marks)	
Theory	Practical	Tutorial	Credit	Th	eory	Pra	ctical	Tut	torial	Total
Theory	Tactical	Tutoriai	cieuit	CE	ESE	CE	ESE	CE	ESE	Total
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

	Section I					
Module.	Content	Hours	Weightage			
No.			in %			
	Modes of Heat Transfer					
1.	Conduction, Convection, Radiation, concept of steady state	05	10			
	and unsteady state heat transfer.					
	Conduction					
	Fourier's law of heat conduction, thermal conductivity					
	of materials – solids, liquids and gases and effect of					
2.	temperature on thermal conductivity, one dimensional	05	15			
	steady state heat conduction through a plane wall,					
	composite wall and cylinder, multi-layer cylinder. Insulation					
	and insulating materials, critical thickness of insulation.					

	Convoction		
3.	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
	Radiation		
4.	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			
	HeatEvchanger		
5.	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

Sr No	Name of Practical/Tutorial	Hours
1.	To determine Heat Transfer through Composite Wall at different	04
	temperature.	
2.	Determination of Thermal Conductivity of Insulating Powder (Asbestos	08
	Powder).	
3.	To find out Heat transfer in Double Pipe Heat Exchanger in Laminar	08
	Flow and Turbulent Flow.	
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	K Dutta	Prentice Hall, India.
Applications		
Heat Transfer	KA Gavahane	Nirali Publications.

Reference Book(s):

Title	Author/s	Publication
Heat Transfer: Principles and	Dutta B. K	PHI
Applications		
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:

C01	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.

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

Department of Chemical Engineering

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

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Exa	minatio	on Scher	ne (Mar	·ks)		
Theory Drastical Tutorial		Cradit	The	eory	Prac	tical	Tute	orial	Total	
Theory	FIACULAI	TULOTIAI	Creuit	CE	ESE	CE	ESE	CE	ESE	TOLAI
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

Sr. No.	Name of Practical	Hours
1	Prepare chart for fertilizer classification with chemical formula and	06
	nutrient content	
2	Estimate nutrient content ($\%$ N, $\%$ P ₂ O, $\%$ K ₂ O) in different fertilizers from	06
	their chemical formula	
3	Estimate percentage of Nitrogen in Ammonium chloride by substitution	06
	method	
4	Estimate percentage of Nitrogen in Ammonium sulfate by substitution	06
	method	
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	M. Gopala Rao	Affiliated East West Press (Pvt) Ltd,
Technology	Sitting	3rd Ed., New Delhi
	Marshall	
Chemical Technology	Pandey G.N. and Shukla	Vani Books Company
-Vol. I and II, 2nd edition		- 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	Austin G.T.	McGraw Hill publication, New Delhi
Industries, 5th edition		

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:

C01	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.

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