

# Shivaji University, Kolhapur

## Department of Technology

### Vision

To be a leader in engineering and technology education, a research centre of global standards to provide valuable resources for industry and society through development of competent technical human resources.

### Mission

1. To develop technocrats of national & international stature committed to the task of nation building.
2. To organize teaching learning programs to facilitate the development of competent and committed professionals for practice, research and academics.
3. To undertake collaborative research projects that offer opportunities for consistent interaction with industries.

## Name of Programme: B.Tech. (Chemical Technology)

### Program Outcomes

1. **Domain specific Engineering knowledge** : Attainment of the ability to acquire and apply knowledge of mathematics, physics, chemistry, basic engineering sciences and Chemical Engineering specialization so as to make analysis of complex chemical engineering problems.
2. **Problem Analysis ability**: Attainment of the ability to acquire knowledge which will enable them to analyze problems while working in chemical and allied industries as well as consultancies.
3. **Acquiring skills to Design/develop solutions to problems**: Acquiring skills in selection, design, erection and control of unit processes and unit operations and to attain ability to understand the past and present trends in manufacturing, production and marketing of chemically derived products.
4. **Capacity to investigate complex problems** : Attainment of the ability to identify new research areas in chemical engineering and to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions, also to make efforts to come up with striking innovations in the field.
5. **Modern tool usage**: Attainment of the ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools including 'modeling and prediction' to complex engineering activities so as to solve advanced engineering problems.
6. **The engineer's connectivity with society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

7. **Environment and sustainability awareness:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Practicing Ethics and Values:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Ability to work as an Individual and in team:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Acquiring Communication Skills:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Well verse with task of Project management and finance aspects:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning attitude:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### Program Specific Outcomes

1. **Professional skills :** Acquiring skills to utilize the knowledge of chemical engineering in innovative, dynamic and challenging environment for design and development of new products, attainment of ability to acquire skills required to help chemical industry through courses like Process Design , Piping Design and the relevant software training
2. **Practical implementation and testing skills:** Attainment of ability to acquire skills required to help chemical industry. These may be imbibed through courses/workshops on industrial safety & hazard management, hands on training for topics like 'analytical techniques', 'instrumentation' required in chemical and allied industry.
3. **Successful career and entrepreneurship:** Transformation of the students into technocrats who will design and develop systems and subsystems for Chemical allied Technologies and few of these technocrats may become entrepreneurs also.

### Course Outcomes

#### Part-I Semester-I

67895	Engineering Mathematics-I	<ol style="list-style-type: none"> <li>1. Students in this course will apply the Procedure and methods to solve technical problems.</li> <li>2. Student can understand how to model real world scenario using Mathematics</li> <li>3. Students will be able to solve computational problems using Scilab/Matlab</li> </ol>
67896	Engineering Physics	<ol style="list-style-type: none"> <li>1. The student would be able to apply the concepts of physics in various branches of engineering</li> <li>2. The student would be able to use the</li> </ol>

		<p>techniques, skills, and modern tools necessary for physics and engineering careers</p> <ol style="list-style-type: none"> <li>3. Understands and apply the concepts of light in optical fibers, light wave communication systems, holography.</li> <li>4. Use lasers as light sources for low and high energy applications.</li> <li>5. Understand the nature and characteristics of ultrasonic waves and its various engineering applications</li> </ol>
67897	Engineering Mechanics	<p>CO1. Differentiate between Scalar and Vector Quantities</p> <p>CO2. Understand the characteristics of force, system of forces , learn to resolve forces.</p> <p>CO3. Understand the moment and couple of forces and effect of moment on rigid body</p> <p>CO4. Compute resultant of coplanar concurrent and non-concurrent force system.</p> <p>CO5. Distinguish between C.G. and Centroid, Compute moment of inertia of plane figures and composite figures.</p> <p>CO6. Understand and analyze beam as a structure and compute support reactions using Lami's theorem &amp; equilibrium Conditions for concurrent, parallel and general force system.</p> <p>CO7. Understand Truss as a structural member and analyze plane trusses by the method of joints And sections</p> <p>CO8. Understand the concept of dynamic as applied to particle.</p> <p>CO9. Introduce &amp; define Kinematics of Rigid body, get idea about translation, rotation, general Plane motion</p> <p>CO10.To Know principle of work</p>
67898	Fundamentals of Mechanical Engineering	<ol style="list-style-type: none"> <li>1. Recall the terms, basic concepts and laws of thermodynamics.</li> <li>2. Explain the working of various mechanical systems like I.C.Engines, Refrigeration and air conditioning systems, power plants, energy conversion devices and power transmission devices.</li> <li>3. Explain various types of manufacturing processes.</li> <li>4. Explain heat and mass transfer and its modes of transfer.</li> <li>5. Analyze power transmission devices with their functions.</li> </ol>

67899	Electronic Components and Devices	<ol style="list-style-type: none"> <li>1. Understand the basics of Electronics component, different materials and their applications.</li> <li>2. Understand the construction , V-I characteristics and application of semiconductor devices</li> <li>3. Analyze different electronic circuits based on diode , transistor and SCR</li> <li>4. Explain the working principle, construction, applications of relays, display devices and transducer.</li> <li>5. Test and verify results of diode and BJT circuits</li> </ol>
67900	Lab.-I Engineering Physics	<ol style="list-style-type: none"> <li>1. The student would be able to use spectrometer, polarimeter, LASER, photodiode for various measurements.</li> <li>2. Test optical components using principles of interference and diffraction of light</li> <li>3. Determine the width of narrow slits, spacing between close rulings using lasers and appreciate the accuracy in measurements.</li> <li>4. Use ultrasonic interferometer for measuring velocity of ultrasound in various liquids.</li> </ol>
67901	Lab-II Engineering Mechanics	<p>CO1. Verify and correlate law of polygon of forces.  CO2. Verify Lami's theorem.  CO3. Verify Equilibrium conditions.  CO4. Determine coefficient of friction for two sliding surfaces.  CO5. Verify Law of Moments.  CO6. Find value of local gravitational acceleration.</p>
67902	LAB- III Fundamental of Mechanical Engineering	<ol style="list-style-type: none"> <li>1. Explain and demonstrate the working of various mechanical systems like I. C. Engines, Refrigeration and air conditioning systems, power plants and steam generators.</li> <li>2. Explain and demonstrate the construction and working of mechanical power transmission devices.</li> <li>3. Explain and demonstrate the construction and working of energy conversion devices.</li> <li>4. Explain and demonstrate the manufacturing processes.</li> </ol>
67903	LAB –IV ELECTRONIC COMPONENTS AND DEVICES	<ol style="list-style-type: none"> <li>1. Understand the diode and transistor characteristics.</li> <li>2. Verify the rectifier circuits using diodes and filter circuits.</li> <li>3. Design various amplifiers like CE, CC, common</li> </ol>

		source amplifiers 4. Study experimentally the characteristics of SCR and JFET
67904	LAB- V PROFESSIONAL COMMUNICATION	<ol style="list-style-type: none"> <li>1. Students will be able to communicate language effectively.</li> <li>2. Students learn to use grammar rules in spoken and written English.</li> <li>3. Students will be able to learn personality traits and soft skills.</li> <li>4. Students acquire required skills for technical writings.</li> <li>5. Students learn fluency and pronunciation.</li> <li>6. Students acquire techniques for presentation skills.</li> </ol>
67905	LAB- VI Matlab and Scilab	<ol style="list-style-type: none"> <li>1. To familiarize the student in introducing and exploring MATLAB &amp; SCILAB software's.</li> <li>2. Understand the main features of the MATLAB and SCILAB</li> <li>3. To enable the student on how to approach for solving Engineering Mathematics problems using MATLAB and SCILAB.</li> <li>4. To solve complicated numerical problems by writing MATLAB and SCILAB programs</li> <li>5. Interpret and visualize simple mathematical functions and operations using MATLAB and SCILAB.</li> </ol>
<b>Part-I Semester-II</b>		
67931	Engineering Mathematics-II	<ol style="list-style-type: none"> <li>1. Students in this course will apply the Procedure and methods to solve technical problems</li> <li>2. Student can understand how to model real world scenario using Mathematics.</li> <li>3. Students will be able to solve computational problems using Scilab/Matlab</li> </ol>
67932	Engineering Chemistry	<p>CO1 Have knowledge of water quality parameters and water softening processes, and calculate hardness of water.</p> <p>CO2 Classify and describe properties and applications of engineering material.</p> <p>CO3 Explain mechanism and properties of lubricants and select lubricants for different service conditions.</p> <p>CO4 Understand the mechanism and control methods of corrosion and apply their knowledge for protection of different metals from corrosion.</p> <p>CO5 Use instrumental methods for the analysis of material.</p>

67933	Fundamentals of Civil Engineering	<p>CO1. Understand how civil engineering is related to other branches.</p> <p>CO2. Find out linear and angular measurements required to prepare a plan or map by using traditional as well as modern instruments.</p> <p>CO3. Find out vertical distances, reduced levels and angles by using total station.</p> <p>CO4. Calculate area of irregular surface by using Mechanical and Digital Planimeter.</p> <p>CO 5. Identify building materials required for construction with current market rates.</p> <p>CO6. Understand use, necessity of submission and working drawing.</p> <p>CO7. Prepare site visit report.</p>
67934	Engineering Graphics	<ol style="list-style-type: none"> <li>1. Identify basic concepts of BIS conventions and their application.</li> <li>2. Interpret first angle and third angle projection system.</li> <li>3. Construct orthographic projections of points, lines and planes.</li> <li>4. Apply principles of projection and construct orthographic and isometric views of an object.</li> <li>5. Develop a skill of visualization to understand and read the drawing.</li> </ol>
67935	Fundamentals of Electrical Engineering	<ol style="list-style-type: none"> <li>1) Develop fundamental understanding about basics of DC and AC circuit .</li> <li>2) Differentiate between electrical and magnetic circuit.</li> <li>3) Explain the working principle, construction, applications of DC machines and AC machines.</li> <li>4) Understand electrical power system, wiring and Earthing .</li> <li>5) Apply different circuit laws to solve electrical circuits and verify results experimentally.</li> </ol>
67936	Lab. – I ENGINEERING CHEMISTRY	<p>CO1 Apply basic concepts of chemistry for analysis.</p> <p>CO2 Determine the various water quality parameters and preparation of polymers</p> <p>CO3 Determine the viscosity of liquid</p> <p>CO4 Estimate the amount of copper and zinc from brass solution</p> <p>CO5 Understand the use of instrumental methods for analysis of the material</p>
67937	Lab. – II FUNDAMENTALS OF CIVIL ENGINEERING	<p>CO1. Understand how civil engineering is related to other branches.</p> <p>CO2. Find out linear and angular measurements required to prepare a plan or map by using</p>

		<p>traditional as well as modern instruments.</p> <p>CO3. Find out vertical distances, reduced levels and angles by using total station.</p> <p>CO4. Calculate area of irregular surface by using Mechanical and Digital Planimeter.</p> <p>CO5. Identify building materials required for construction with current market rates.</p> <p>CO6. Understand use, necessity of submission and working drawing.</p> <p>CO7. Prepare site visit report.</p>
67938	Lab. – III Engineering Graphics	<ol style="list-style-type: none"> <li>1. Identify and implement basic concepts of BIS conventions to sketch Engineering drawing.</li> <li>2. Create geometric constructions with hand tools.</li> <li>3. Construct orthographic projection and sectional view of a machine part.</li> <li>4. Create isometric projection from multiview drawings of an object.</li> <li>5. Sketch projection of solids and development of lateral surfaces of solids.</li> </ol>
67939	Lab. – IV FUNDAMENTALS OF ELECTRICAL ENGINEERING	<ol style="list-style-type: none"> <li>1) Perform and measure the basic electric circuit experiment with knowledge of fundamental laws</li> <li>2) Demonstrate behavior of R,L, C,AC circuit.</li> <li>3) Understand use of various electrical measuring instruments.</li> <li>4) Understand application of DC machines and testing of single phase transformer.</li> </ol>
67940	Lab.– V Workshop Practice	<ol style="list-style-type: none"> <li>1. Execute safety measures, while working in a workshop.</li> <li>2. Identify and use of various hand tools and measuring instruments.</li> <li>3. Demonstrate and use of different fitting tools and prepare a fitting job as per given drawing.</li> <li>4. Demonstrate and use of different Carpentry tools and prepare a wooden job as per given drawing.</li> <li>5. Perform Arc welding operation to prepare a welding joint.</li> </ol>
67941	Lab. VI COMPUTER PROGRAMMING	<ol style="list-style-type: none"> <li>1. Illustrate the flowchart and design of an algorithm for a given problem and to develop C programs using operators</li> <li>2. Develop conditional and iterative statements to write C programs</li> <li>3. Design C programs with the use of Pointers to access arrays, strings and functions</li> </ol>

		<ol style="list-style-type: none"> <li>4. Exercise user defined data types including structures and unions to solve problems.</li> <li>5. Design C programs using pointers and to allocate memory using dynamic memory management</li> </ol> <p>Demonstrate files concept to show input and output of files in C</p>
<b>Part-II Semester-III</b>		
70126	Chemistry-I	<ol style="list-style-type: none"> <li>1. Will be familiar with adsorption and catalysis</li> <li>2. Will know the basics of photochemistry and chemical kinetics</li> <li>3. Will have basic knowledge on coordination chemistry</li> <li>4. Will know the preparations of important chemicals and their properties</li> <li>5. Will have the basic knowledge of manufacturing process for various chemicals widely used in chemical industries</li> <li>6. Will be familiar with different types of solutions</li> <li>7. Will have basic knowledge about various theories required for coordination chemistry</li> <li>8. Understand importance of Physical Chemistry with respect to environmental concerns and interdisciplinary tasks</li> </ol>
70127	Chemical Engineering Thermodynamics-I	<ol style="list-style-type: none"> <li>1. Students will be able to understand concepts of heat, work and energy conversion and Calculate heat and work quantities for industrial processes</li> <li>2. Students will be able to demonstrate the use and applications of the first and second laws of thermodynamics</li> <li>3. Students will be able to apply knowledge to calculate enthalpies, entropies real gases from equations of state and measured quantities</li> <li>4. Students will be able to explain the importance of assuming reversibility in making engineering calculations of work</li> <li>5. Students will be able to simplify and combine the general energy and entropy balances to solve given textbook and homework problems</li> <li>6. Students will be able to sketch and read P-H and T-S diagrams</li> </ol>
70128	Engineering Mathematics-III	<ol style="list-style-type: none"> <li>1. Learn fundamentals of ordinary differential equations</li> <li>2. Learn fundamentals of Partial Differential Equation</li> <li>3. Solve ordinary differential equations and Partial Differential Equation</li> <li>4. Solve an initial value problem for an nth order ordinary differential equation using the Laplace</li> </ol>



		<p>transform</p> <ol style="list-style-type: none"> <li>5. Solve Laplace Transform and Inverse Laplace Transforms</li> <li>6. Solve the Vector Calculus</li> <li>7. Understand, recall and apply the concepts underlying the course</li> <li>8. Further analyze and solve the chemical engineering problems based on the concepts of this course</li> </ol>
70129	Fluid Flow Operations	<ol style="list-style-type: none"> <li>1. Analyze problems of velocity profiles by simplification of equations of motion in simple fluid flow</li> <li>2. Design equations of boundary layer thicknesses, friction factor</li> <li>3. Identify Bernoulli's equation at different conditions</li> <li>4. Evaluate pressure drop, power requirements for single phase flow in pipes</li> <li>5. Understand two phase gas/liquid pressure drop</li> <li>6. Acquire details of power requirements, NPSH requirements of pumps</li> <li>7. Apply equations of drag force and terminal settling velocity for single particles</li> <li>8. Calculate pressure drop in fixed and fluidized beds</li> </ol>
70130	Material Science Technology	<ol style="list-style-type: none"> <li>1. Gain knowledge necessary for material selection and understand material handling</li> <li>2. Understand the process of performance evaluation of materials including economic considerations</li> <li>3. Apply knowledge of mathematics, science and engineering in material selection and handling</li> <li>4. Solve problems of simple three dimensional elastic solids using concepts of stress and strain</li> <li>5. Calculate the stresses and strains in axially-loaded members, circular torsion members, and members subject to flexural loadings</li> <li>6. Calculate the stresses and strains associated with thin-wall spherical and cylindrical pressure vessels</li> </ol>
70132	Chemistry-I Laboratory	<ol style="list-style-type: none"> <li>1. Apply practical knowledge to industrial applications and for developing or modifying methods</li> <li>2. Know the preparations of Coordination compounds</li> <li>3. Identify protocol for purity analysis</li> <li>4. Know the kinetics of various reactions</li> <li>5. Motivation towards innovations of novel techniques in chemistry</li> <li>6. Learning to work in group and imitate Standard Procedure for practical work</li> </ol>
70133	Engineering	<ol style="list-style-type: none"> <li>1. Learn fundamentals of ordinary differential</li> </ol>

	Mathematics-III	<p>equations</p> <ol style="list-style-type: none"> <li>2. Learn fundamentals of Partial Differential Equation</li> <li>3. Solve ordinary differential equations and Partial Differential Equation</li> <li>4. Solve an initial value problem for an nth order ordinary differential equation using the Laplace transform</li> <li>5. Solve Laplace Transform and Inverse Laplace Transforms</li> <li>6. Solve the Vector Calculus</li> <li>7. Understand, recall and apply the concepts underlying the course</li> <li>8. Further analyze and solve the chemical engineering problems based on the concepts of this course</li> </ol>
70134	Fluid Flow Operations Laboratory	<ol style="list-style-type: none"> <li>1. Acquiring skills related to fluid flow handling e.g. volumetric flow rate measurement, fluid pressure measurement etc</li> <li>2. Know and estimate Pressure drop in straight pipes, fluidized bed, packed bed, helical coil and annular pipes</li> <li>3. Study the performance characteristics of pumps</li> <li>4. Study of basic principles underlying the fluid flow operations</li> <li>5. Understand principles and operations of various flow measurement devices</li> </ol>
70135	Computer Programming for Chemical Engineers Laboratory	<ol style="list-style-type: none"> <li>1. Students will be able to Design, create, build, and debug Visual Basic applications</li> <li>2. Students will be able to Explore Visual Basic's Integrated Development environment (IDE)</li> <li>3. Students will be able to implement syntax rules in Visual Basic programs</li> <li>4. Explain variables and data types used in program development</li> <li>5. Apply arithmetic operations for displaying numeric output</li> <li>6. Apply procedures, sub-procedures, and functions to create manageable code</li> </ol>
70136	Analytical Chemistry Laboratory	<ol style="list-style-type: none"> <li>1. Graduates will be able to master a broad set of chemical knowledge concerning the fundamentals in the basic areas of the discipline</li> <li>2. Graduates will be able to use standard laboratory equipment, modern instrumentation, and classical techniques to carry out experiments</li> <li>3. Graduates will be able to communicate the concepts and results of their laboratory experiments through effective writing and oral communication skills</li> <li>4. Graduates will be able to formulate and solve</li> </ol>

		problems in the laboratory
70137	Soft Skills Development	<ol style="list-style-type: none"> <li>1. Students are able to expertise in self development, effective communication skills and interview skills</li> <li>2. Understand how to handle situation and take decision</li> <li>3. Equip to any sort of interviews particularly job interviews</li> <li>4. Acquaintance with documentation skills</li> <li>5. Become self reliant and responsible</li> <li>6. Team build up, its development and management</li> </ol>
69847	Environmental Studies	<ol style="list-style-type: none"> <li>1. Develop an understanding of different natural resources including renewable resources</li> <li>2. Realize the importance of ecosystem and biodiversity for maintaining ecological balance</li> <li>3. Aware of important acts and laws in respect of environment</li> <li>4. Demonstrate critical thinking skills in relation to environmental affairs</li> <li>5. Develop an understanding of environmental pollutions and hazards due to engineering/technological activities and general measures to control them</li> <li>6. Demonstrate knowledge and application of communication skills and the ability to write effectively in a variety of environmental contexts</li> <li>7. Demonstrate an ability to integrate the many disciplines and fields that intersect with environmental concerns</li> <li>8. Demonstrate an appreciation for need for sustainable development and role of science</li> </ol>
<b>Part-II semester-IV</b>		
70138	Chemistry-II	<ol style="list-style-type: none"> <li>1. Gain knowledge on various reaction mechanism,</li> <li>2. Know the preparation of organic compounds and their properties.</li> <li>3. Elaborate the processes for producing petrochemicals</li> <li>4. This will be a precursor for the study on Chemical Reaction Engineering.</li> <li>5. Will know details about heterocyclic compounds.</li> <li>6. Will know elaborated methods of preparation of soaps and dyes.</li> <li>7. Will became familiar with drugs and various processes of pharmaceutical industries.</li> <li>8. Understand importance of Organic Chemistry with respect to environmental concerns and interdisciplinary tasks..</li> </ol>
70139	Chemical Engineering Thermodynamics-	<ol style="list-style-type: none"> <li>1. Students will be able to correlate experimental VLE data of pure component and ideal mixtures with suitable equations.</li> </ol>

	II	<ol style="list-style-type: none"> <li>2. Students will be able to estimate mixture properties from group contribution methods.</li> <li>3. Students will be able to predict the equilibrium products and their concentration in equilibrium when dealing with systems involving chemical reactions.</li> <li>4. Students will be able to apply phase equilibrium principles to calculate bubble and dew points of ideal mixtures and construct T-x- y and P-x- y diagrams</li> <li>5. Students will be able to calculate chemical equilibrium in non-ideal mixtures</li> <li>6. Students will be able to apply activity coefficient models to calculate excess properties of liquids.</li> </ol>
70140	Chemical Process Calculations	<ol style="list-style-type: none"> <li>1. Students are expected to understand basics Chemical calculations</li> <li>2. Given the composition of a mixture expressed in terms of mass fractions, calculate the composition in terms of mole fractions or vice versa</li> <li>3. Given the component partial pressures of an ideal gas mixture and the total gas pressure, determine the mixture composition in either mole fractions, mass fractions or volume fractions</li> <li>4. Find out need of writing mass and energy balance for various unit operations in chemical process industries</li> <li>5. Use mathematical knowledge for solving mass and energy balance problems</li> <li>6. Learn to integrate the data, formulate the mass and energy balance problems and to solve them</li> <li>7. Learn to calculate conversion, selectivity etc for various reactions with and without recycle</li> <li>8. Learn to use various mass and energy balance writing techniques in process design in chemical process industries</li> </ol>
70141	Heat Transfer Operations	<ol style="list-style-type: none"> <li>1. Learn fundamentals of heat transfer</li> <li>2. Identify principles of different modes of heat transfer</li> <li>3. Design and analyze heat transfer operations and equipment</li> <li>4. Compare performances and select type of heat transfer equipment</li> <li>5. Learn industrial applications of heat exchangers and evaporators</li> <li>6. Solve heat transfer problems of different difficulty levels through tutorials</li> <li>7. Complete design of a heat exchanger through assignments/ group task</li> <li>8. Understand importance of heat transfer with respect to societal aspects, environmental concerns,</li> </ol>

		professional ethics, team work, interdisciplinary tasks
70142	Mechanical Operations	<ol style="list-style-type: none"> <li>1. Choose proper operation for handling of material</li> <li>2. Gets expertise in solving size reduction problems using crushing law and screening of the particulate solids</li> <li>3. Understand sedimentation and settling of solid particle in a liquid</li> <li>4. Learn the operation of mixing of solid, liquid material etc.</li> <li>5. Recognize the importance of filtration process, gas cleaning etc.</li> <li>6. Learn to make distinction between solids and liquids based on course basics</li> <li>7. Understand the mechanism of various chemical industry processes involving mechanical Operations</li> <li>8. Able to utilize the technical concepts to enhance the bridge between the various other courses</li> </ol>
70143	Chemistry-II Laboratory	<ol style="list-style-type: none"> <li>1. Know the preparations of organic compounds.</li> <li>2. Formulate thought process for organic compounds analysis.</li> <li>3. Importance of simple approaches to characterize compounds before using sophisticated tools.</li> <li>4. Find simple techniques for purity analysis.</li> <li>5. Motivation towards innovations of novel techniques in chemistry.</li> <li>6. Learning to work in group and imitate Standard Procedure for practical work</li> </ol>
70144	Heat Transfer Operations Laboratory	<ol style="list-style-type: none"> <li>1. Understanding fundamentals of some major Heat transfer operations through practical work.</li> <li>2. Getting set for practical heat transfer operations</li> <li>3. Application of heat transfer design principles and be mechanic for heat transfer devices</li> <li>4. Building foundation for process intensification and be adapted to handle heat transfer operations</li> <li>5. Learning to work in group and imitate Standard Operating Procedure for practical work v.i.z. responding to the guide</li> <li>6. Motivation towards innovations for novel systems of heat transfer</li> </ol>
70145	Mechanical Operations Laboratory	<ol style="list-style-type: none"> <li>1. Students are able to operate different crushers for physical operation.</li> <li>2. Students are able to solve the engineering problems which are related to unit operation.</li> <li>3. Students are able to analyze the sizes of particulate material.</li> <li>4. Students are able to choose the appropriate operation for separation of solid and fluids.</li> <li>5. Students are able to handle the filtration</li> </ol>

		equipment with enhancing technical skills.
70146	Applied Electrical and Electronics Laboratory	<ol style="list-style-type: none"> <li>1. Understand the working principle, performance, control and applications of AC, DC Machines and transformer</li> <li>2. Analyze and solve AC, DC machine and Transformer related problems</li> <li>3. Monitor and evaluate asses and compare of various sensors and transducers and came to conclusion for the best selection for the desired applications</li> <li>4. Create, design, formulate, generate and deliver the solutions for given applications using best applicable sensors and transducers</li> <li>5. Remembering the operating principles of common electrical and electronic measuring instruments and their application to testing</li> </ol>
70147	Introduction to Performing Arts	<ol style="list-style-type: none"> <li>1. Students will be able to learn Fundamentals and types of Music and other allied arts</li> <li>2. Students will be able to analyze, appreciate, and interpret significant works of art</li> <li>3. Students will demonstrate critical thinking through analysis and evaluation of works of art</li> <li>4. Students will develop good listening and viewing skills</li> <li>5. Students will be able to understand the 'Gharana' system in Music</li> <li>6. Students will understand the classification of Musical instruments</li> <li>7. Students will demonstrate mastery of their designated area of concentration</li> <li>8. Students will demonstrate comprehension of global perspectives in visual culture</li> </ol>
<b>Semester-V</b>		
70909	Thermal Engineering and Plant Utilities	<ol style="list-style-type: none"> <li>1. Apply knowledge of mathematics, science and engineering for identifying and calculating the requirement of utilities in the industrial operations.</li> <li>2. Explain refrigeration cycles.</li> <li>3. Describe working and properties of different pumps and compressors.</li> <li>4. Explain boilers and their types with their working.</li> <li>5. This course will provide a gist of the theory behind the Air conditioning and will emphasize direct applications of theory to design of an Air conditioning system.</li> <li>6. Apply the general principles of psychometric and applied psychometrics in Air conditioning with knowledge of load estimation, equipment selection, duct design etc.</li> <li>7. Apply the general principles of solar thermal engineering to design solar energy harnessing</li> </ol>

		<p>devices and make professionals in power and energy industry fields.</p> <p>8. Explain importance of inert gases and industrial inerting.</p>
70910	Chemical Reaction Engineering -I	<ol style="list-style-type: none"> <li>1. Apply knowledge of mathematics, science and engineering and apply basic knowledge of classification of reactions.</li> <li>2. Explain kinetics of competing reactions and their influence on product yield and selectivity.</li> <li>3. Thorough with fundamentals of kinetics including definitions of rate and forms of rate expressions and relationships between moles, concentration, extent of reaction and conversion.</li> <li>4. Plan and interpret experimental data to determine kinetic parameters for chemical reactions</li> <li>5. Derive batch, CSTR, and PFR performance equations from general material balances etc.</li> <li>6. Do size and performance calculations on isothermal plug, mixed, and batch reactors for a homogeneous and heterogeneous reaction from given rate data or a rate expression.</li> <li>7. Develop skills to choose the right reactor among single, multiple, recycle reactors etc.</li> <li>8. Apply mathematical techniques to analyze chemical reactions.</li> </ol>
70911	Inorganic Chemical Technologies	<ol style="list-style-type: none"> <li>1. Explain manufacturing of various fuels, fuel gases and industrial gases.</li> <li>2. Describe various ceramic based products.</li> <li>3. Explain the manufacturing of various sodium based inorganic chemicals.</li> <li>4. Explain the manufacturing of various sulphur based inorganic chemicals.</li> <li>5. Explain the manufacturing of various potassium based inorganic chemicals.</li> <li>6. Elaborate the manufacturing of various nitrogen and ammonia based based inorganic chemicals.</li> <li>7. Draw process flow diagrams/process block diagrams for the manufacture of various inorganic chemicals from process description.</li> </ol>
70912	Safety in Chemical Industry	<ol style="list-style-type: none"> <li>1. Analyze the effect of release of toxic substances.</li> <li>2. Understand the industrial laws, regulations and source models.</li> <li>3. Apply the methods of prevention of fire and explosions.</li> <li>4. Explain the relief and its sizing methods.</li> <li>5. Describe the methods of hazard identification and preventive measures.</li> <li>6. Take the responsibility to ensure safety in chemical industry.</li> </ol>
70913	Mass Transfer	<ol style="list-style-type: none"> <li>1. Understand mass transfer operation with the</li> </ol>

	Operations-I	<p>concept of molecular diffusion.</p> <p>2. Explain mass transfer operation with the concept of molecular diffusion, flux rate, theories of mass transfer, mass Transfer coefficient, designed for equipment in which two phases are contacted.</p> <p>3. Conceptually describe the role of mass transfer in various unit operations including distillation, extraction etc.</p> <p>4. Use the McCabe-Thiele Method, Ponchon Savarit Method for solving distillation problems and analyze Distillation process.</p> <p>5. Analyze implications of factors affecting distillation column operation and design like the effect of reflux ratio, feed conditions etc.</p> <p>6. Describe processes like extraction and leaching, adsorption and use analytical, graphical techniques to solve these types of problems.</p> <p>7. Develop and apply criteria for selecting among alternative separation technologies available</p>
70914	Chemical Reaction Engineering- I Laboratory	<p>1. Design experiments involving chemical reactors, and analyzing and interpreting data.</p> <p>2. Analyze chemical reactors and reaction systems.</p> <p>3. Evaluate the activation energy of the reactions.</p> <p>4. Solve problems of mass transfer with reaction in solid catalyzed reactions.</p> <p>5. Do design and sizing of industrial scale reactor on the basis of kinetic data obtained at lab scale.</p>
70915	Mass Transfer Operations-I Laboratory	<p>1. Perform experiments in relation to the Mass Transfer fundamentals.</p> <p>2. Find out diffusivity and mass transfer coefficients.</p> <p>3. Compare the equilibrium data developed with the theoretical data.</p> <p>4. Evaluate the effectiveness of different separation techniques.</p> <p>5. Motivation towards innovations of novel techniques in Mass Transfer.</p>
70916	Case Studies and Seminar	<p>1. Gain self-confidence about their career path</p> <p>2. Prepare for any presentation due to increased confidence and practiced soft skills.</p> <p>3. Respond to the challenges through the varied case studies learnt and attended by them and their peer group.</p> <p>4. Development their overall personality by carving their presentation, aptitude and research skills.</p> <p>5. Work in a team for the benefit of their organization and the society.</p> <p>6. Set themselves for lifelong learning approach.</p>
70917	Industrial Safety and Hazard	<p>1. Evaluate workplace to determine the existence of occupational safety and health hazards</p>



	Management Laboratory	<ol style="list-style-type: none"> <li>Identify relevant regulatory and national consensus standards along with best practices that are applicable.</li> <li>Select appropriate control methodologies based on the hierarchy of controls</li> <li>Analyze injury and illness data for trends.</li> </ol>
70918	Introduction to Foreign Language	<ol style="list-style-type: none"> <li>The students will be able to acquire a good knowledge the basic grammar of foreign language and learn Alphabet, Common Words and Phrases in foreign language.</li> <li>The students will also be able to learn to read the simple texts in foreign language.</li> <li>The students would be able to speak a little using the greetings, well wishes etc. in Foreign Language.</li> <li>The students will learn to count numbers, answer to the questions like, what is your name, surname, tell age, and can initiate little communication in Foreign Language.</li> <li>The students can also translate simple sentences in foreign language.</li> </ol>
71765	Internship I	<ol style="list-style-type: none"> <li>Acquaint to actual working environment.</li> <li>Acquire ability to utilize technical resources.</li> <li>Write technical documents and give oral presentations related to the work completed.</li> <li>Develop attitude of a team player and aptitude for lifelong learning.</li> </ol>
Semester-VI		
70919	Chemical Reaction Engineering-II	<ol style="list-style-type: none"> <li>Apply knowledge of mathematics, science and engineering.</li> <li>Understand and apply the concepts of heat capacity, latent heat, heat of reaction, heat of combustion, and heat of formation.</li> <li>Recognize the limitations imposed by non-ideal flow.</li> <li>Predict the conversion in a non-ideal reactor using tracer information.</li> <li>Design reactors for fluid-solid reactions.</li> <li>Develop the mechanism and determine the deactivation rate of catalytic reactions.</li> <li>Determine the effectiveness of catalyst and can carry out the experimentation to find the rate.</li> <li>Design towers for gas-liquid reactions with and without mass transfer considerations.</li> </ol>
70920	Industrial Pollution Control	<ol style="list-style-type: none"> <li>Analyze the effect of pollutant on environment.</li> <li>Explain the meteorological aspects of the air pollution.</li> <li>Describe the air pollution control methods.</li> <li>Select the technologies for water/ waste water removal.</li> <li>Design unit operations for pollution control.</li> </ol>

		6. Apply the environmental concepts to control and management of air, water pollution.
70921	Mass Transfer Operations-II	<ol style="list-style-type: none"> <li>1. Apply their fundamental knowledge in the area of chemical engineering.</li> <li>2. Explain various operation of mass transfer use in worldwide chemical industry.</li> <li>3. Execute proper material balance for different operations in chemical or pharmaceutical industry.</li> <li>4. Solve the engineering problems of drying, adsorption, evaporation, crystallization operations etc.</li> <li>5. Explain the significance, role and selection of membrane separations operations and handling.</li> <li>6. Design the equipment on the basis of raw material and their parameter.</li> </ol>
70922	Organic Chemical Technologies	<ol style="list-style-type: none"> <li>1. Explain manufacturing processes of organic products and also the associated troubleshoot.</li> <li>2. Describe process flow diagram and various parameters concerning various industries and products.</li> <li>3. Analyze and solve engineering problems during production of respective products.</li> <li>4. Acquire awareness for organic process based industry practices and their importance for the society.</li> <li>5. Adapt to thinking of internship and entrepreneurship in the field of organic products and processes.</li> <li>6. Respond to various hands on skills required while working in these types of industries.</li> </ol>
70923	Process Instrumentation and Control	<ol style="list-style-type: none"> <li>1. Explain working principles of basic instruments available for flow, pressure, level and temperature measurement</li> <li>2. Model dynamical systems.</li> <li>3. Describe the use and measurement of transfer functions.</li> <li>4. Apply knowledge of mathematics [Laplace Transforms] to model and solve the models describing dynamics of chemical processes.</li> <li>5. Evaluate stability of control loops.</li> <li>6. Describe dynamic behavior and stability of chemical process control systems.</li> </ol>
70924	Chemical Reaction Engineering- II Laboratory	<ol style="list-style-type: none"> <li>1. Design experiments involving chemical reactors, and analyzing and interpreting data.</li> <li>2. Analyze chemical reactors and reaction systems.</li> <li>3. Evaluate the non ideality in the reactors.</li> <li>4. Solve problems of mass transfer with reaction in solid catalyzed reactions.</li> <li>5. Design and sizing of industrial scale reactor on the basis of kinetic data obtained at lab scale.</li> </ol>

70925	Mass Transfer Operations-II Laboratory	<ol style="list-style-type: none"> <li>1. Apply practical knowledge to industrial applications and for developing or modifying methods.</li> <li>2. Explain the preparations of solid crystals using crystallization operation and evaporation of solution using different heating media.</li> <li>3. Calculate the experimental work of drying, evaporation and crystallization operations.</li> <li>4. Describe the kinetics of adsorption operation.</li> <li>5. Acquire motivation towards innovations of novel techniques in mass transfer operations.</li> <li>6. Develop attitude to work in group and imitate Standard Procedure for practical work.</li> </ol>
70926	Organic Chemical Technologies Laboratory	<ol style="list-style-type: none"> <li>1. Acquire firm foundation in the fundamentals and application of current chemical theories including those in analytical organic and physical chemistry.</li> <li>2. Design and carry our scientific experiments as well as accurately record and analyze the results of such experiments.</li> <li>3. Communicate the results of scientific work.</li> <li>4. Explore new areas of research in both chemistry and allied fields of science and technology.</li> </ol>
70927	Process Instrumentation and Control Laboratory	<ol style="list-style-type: none"> <li>1. Describe the modern hardware and instrumentation needed to implement process control.</li> <li>2. Analyze different components of a control loop.</li> <li>3. Realize practical issues in control engineering and the benefits of control engineering.</li> <li>4. Explain effect of P, PI and PID controllers in process control.</li> <li>5. Choose PID modes that effect controllability, speed of response the control systems.</li> </ol>
70928	Mini Project	<ol style="list-style-type: none"> <li>1. Develop the ability to choose the problem and formulate it.</li> <li>2. Apply their fundamental knowledge according to their competency for solve engineering problems.</li> <li>3. Develop their leadership quality.</li> <li>4. Achieve the project's goals.</li> <li>5. Prepare a technical report based on the Mini project.</li> <li>6. Deliver technical seminar based on the Mini Project work carried out.</li> </ol>
70929	Industrial Visits	<ol style="list-style-type: none"> <li>1. Get the exposure to the real workstations, plants, machines and systems.</li> <li>2. Interact with the senior functional experts / supervisors to explain about company functions.</li> <li>3. Receive expert's briefing about the functioning of machines and systems.</li> <li>4. Have the face to face session with technical or administrative experts of the organization to ask</li> </ol>

		<p>questions and clarify doubts.</p> <p>5. Acquainted about the company policies in terms of production, quality, and service management.</p>
70930	Research Methodology	<p>1. Understand some basic concepts of research and its methodologies.</p> <p>2. Identify appropriate research topics.</p> <p>3. Select and define appropriate research problem and parameters.</p> <p>4. Prepare a project proposal (to undertake a project).</p> <p>5. Organize and conduct research (major project) in a more appropriate manner write a research report.</p>
Semester VII		
74101	Biochemical Engineering	<p>1. Calculate the kinetic parameters of enzymatic reactions</p> <p>2. Calculate and analyze the kinetic parameters for microbial growth</p> <p>3. Analyze bioprocess design and operation</p> <p>4. Select suitable bioreactor</p> <p>5. Understand how biological products are recovered</p>
74102	Petroleum Refinery Engineering (Elective-I)	<p>1. Define the composition, evaluation and refining of crude oil</p> <p>2. Know drilling operation of oil and gas</p> <p>3. Illustrate the quality of petroleum product by understanding different tests</p> <p>4. Understand the importance of cracking, distillation process of petroleum for the production of valuable products</p> <p>5. Describe the process of separation of undesired compounds from crude oil</p> <p>6. Understand the control parameters with respect to corrosion of petroleum processing equipment</p>
74103	Advanced Separation Techniques (Elective-I)	<p>1. Understand fundamentals of separation processes</p> <p>2. Apply their minds for selection of different industrial separation techniques</p> <p>3. Choose the membranes for various industrial applications</p> <p>4. Explain the nature of separation of liquid mixture with enhanced techniques</p> <p>5. Explain various features of biochemical processes</p> <p>6. Describe the downstream processing with help of nature of biochemical product</p> <p>7. Analyze the methods of product purification in biochemical processes</p> <p>8. Analyze the methods of final product formulation and finishing operations</p>
74104	Polymer Chemistry (Elective-I)	<p>1. Define the scope of Polymer Chemistry</p> <p>2. Understand the condensation polymerization, addition polymerization and other polymerization techniques</p>

		<ol style="list-style-type: none"> <li>3. Learn different molecular weight determination methods used for polymers</li> <li>4. Get details of the application of polymers in present and future</li> </ol>
74108	Drugs and Pharmaceutical Technology (Elective-I)	<ol style="list-style-type: none"> <li>1. Able to work competently in Pharma industry</li> <li>2. Capable of utilization of engineering knowledge in pharmacy and Visa-Versa</li> <li>3. Attain more and more opportunities in Pharma sector in India and abroad</li> <li>4. Apply their knowledge of analytical techniques for quality assurance and control department of industry</li> <li>5. Work in team for quality control aspects of Pharmaceutical Industry</li> </ol>
74112	Process Equipment Design	<ol style="list-style-type: none"> <li>1. Demonstrate the design procedure of process equipments used in process plants</li> <li>2. Explain basics of process equipment design and important parameters of equipment design</li> <li>3. Design pressure vessels subjected to internal and external pressure</li> <li>4. Design special vessels (e.g. tall vessels) and various parts of vessels (e.g. heads)</li> <li>5. Design shell and tube heat exchanger</li> <li>6. Design sieve tray distillation column</li> </ol>
74113	Industrial Economics and Management	<ol style="list-style-type: none"> <li>1. Understand of the happenings in the field of economics and preliminary idea about management</li> <li>2. Aware of different type of market policies and causes of inflation</li> <li>3. Describe the nature and characteristics of Indian economy</li> <li>4. Apply their knowledge for well functioning of management</li> <li>5. Develop their skill in different way for marketing management</li> <li>6. Recognize the objective, function and importance of financial management</li> </ol>
74114	Process Modeling and Simulation	<ol style="list-style-type: none"> <li>1. Explain the fundamentals of mathematical modeling</li> <li>2. Apply the fundamental laws to develop the mathematical model for various chemical processes</li> <li>3. Describe chemical engineering processes in mathematical form and create simulation models of various types</li> <li>4. Solve the mathematical models using numerical methods</li> <li>5. Simulate a process using process simulators</li> </ol>

74115	Process Equipment Design Laboratory	<ol style="list-style-type: none"> <li>1. Identify equipment and process involved in process flow diagrams</li> <li>2. Design and draw Heads and closures, Keys and couplings, Supports for vessels</li> <li>3. Understand the basic concepts and operations of various chemical equipments and flow sheets related to chemical engineering design and drawing</li> </ol>
74116	Process Modeling and Simulation Laboratory	<ol style="list-style-type: none"> <li>1. Represent the process in terms of mathematical equations</li> <li>2. Acquire hands on experience on simulation packages and tools</li> </ol>
74117	Comprehensive Tests	<ol style="list-style-type: none"> <li>1. Solve engineering problems</li> <li>2. Understand the basic concept and will able to solve the numerical questions</li> <li>3. Learn to solve multiple choice questions</li> <li>4. Improve overall level of proficiency</li> </ol>
74118	Major Project- Phase I	<ol style="list-style-type: none"> <li>1. Apply their fundamental knowledge for demonstrating the depth technical competency in the area of chemical engineering</li> <li>2. Develop the ability to carry out research and development work</li> <li>3. Apply oral, graphical and written communication in both technical and non-technical environment</li> </ol>
74119	Internship II	<ol style="list-style-type: none"> <li>1. Acquaint to actual working environment</li> <li>2. Acquire ability to utilize technical resources</li> <li>3. Write technical documents and give oral presentations related to the work completed</li> <li>4. Develop attitude of a team player and aptitude for lifelong learning</li> </ol>
74120	Introduction to Indian Constitution	<ol style="list-style-type: none"> <li>1. Associate with constitution of India</li> <li>2. State fundamental duties.</li> <li>3. Describe union and state executives.</li> <li>4. Discuss constitutional provisions</li> <li>5. Illustrate electoral process</li> <li>6. Report the role of democracy in welfare of society</li> </ol>
Semester-VIII		
74221	Petrochemical Technology (Elective-II)	<ol style="list-style-type: none"> <li>1. Understand the fact of petrochemical industry from its origin, economic growth and future scope ordemand</li> <li>2. Recognize sources of crude oil worldwide and classify petrochemicals on the basis of hydrocarbon composition</li> <li>3. Describe techniques of separation of gases of the first generation of petrochemical</li> <li>4. Draw a flow sheet of production of second and third generation of petrochemical; and also</li> </ol>

		<p>know about the miscellaneous petrochemical</p> <ol style="list-style-type: none"> <li>5. Develop understanding about petrochemical product like surfactant, polymer, fiber and explosive material like RDX and TNT</li> <li>6. Realize challenges and opportunities of petrochemical industry</li> </ol>
74222	Industrial Biotechnology (Elective-II)	<ol style="list-style-type: none"> <li>1. Demonstrate the knowledge of biotechnology in various fields</li> <li>2. Know cell function and metabolism process</li> <li>3. Know about other uses of biotechnology in medical field and industrial genetics.</li> <li>4. Understand how biotechnology helps in agricultural, food and beverage industry, chemical industries</li> </ol>
74223	Polymer Technology (Elective-II)	<ol style="list-style-type: none"> <li>1. Learn fundamentals of macromolecular science classification of polymers, and concept of average molecular weight and determination of molecular weights by using different methods</li> <li>2. Compare between natural and man-made polymers</li> <li>3. Understand different polymerization methods and polymerization kinetics</li> <li>4. Learn degradation of polymers, role of the following additives in the polymers &amp; uses of polymers</li> <li>5. Get introduced to manufacturing, properties of different polymers and their uses and compounding of polymer resins</li> </ol>
74224	Food Process Technology (Elective-II)	<ol style="list-style-type: none"> <li>1. Become aware of preserving the food materials make their products to make available them in off season</li> <li>2. Provide solution for spoilage of fruit and vegetables while handling and storage</li> <li>3. Describe storage of food in perfect consumable condition for a longer time without change in its nutritional value</li> <li>4. Learn to extend the shelf life of the food materials products with use of various preservation techniques</li> <li>5. Realize importance of value added products from the fruits and vegetables so that farmers will get more income</li> <li>6. Develop ability for formulation of products, and</li> </ol>

		will learn to solve agriculture and engineering problems
74231	Energy Resources and Utilization	<ol style="list-style-type: none"> <li>1. Identify different sources of energy and basic technology</li> <li>2. Understand characteristic properties of fuel</li> <li>3. Demonstrate petroleum product refining process</li> <li>4. Describe the analysis, specification and testing of fuels</li> <li>5. Compare performance and selection of fuel processing equipment</li> <li>6. Understand the importance of renewable energy sources for power generation</li> <li>7. Understand the combined heat and power system in chemical industries</li> </ol>
74232	Process Economics and Project Engineering	<ol style="list-style-type: none"> <li>1. Use profitability analysis for choosing alternatives in their project work</li> <li>2. Understand and analyze profit and loss account</li> <li>3. Recognize business cycle</li> <li>4. Aware of various network analysis methods</li> <li>5. Describe the economic factors for setup of industry</li> </ol>
74233	Special Chemical Technologies	<ol style="list-style-type: none"> <li>1. Understand the importance of process and product design that are safe and hazard free</li> <li>2. Realize the importance of process and product modification to make them green, safe and economically viable</li> <li>3. Understand the applications of field of nano-science and technology</li> <li>4. Describe the basic textile wet processing techniques and methods</li> <li>5. Identify the dominant pathways and sources of pesticide contamination in the agricultural landscape</li> </ol>
74234	Transport Phenomena	<ol style="list-style-type: none"> <li>1. Understand concepts of viscosity, transport equation and mechanism of transports</li> <li>2. Know analogy between heat, mass and momentum transfer, analyze bioprocess design and operation</li> <li>3. Identify the mixing problems encountered in process industries</li> <li>4. Understand the concept of boundary layer and its application for flow</li> <li>5. Understand the velocity/temperature and the concentration profile for laminar as well as turbulent flow through circular pipe</li> <li>6. Understand the fundamentals and applications of CFD</li> </ol>
74235	Piping and Instrumentation design and drawing	<ol style="list-style-type: none"> <li>1. Identify and draw ISA (Instrumentation Symbols and Identification) symbols</li> <li>2. Identify common symbols used on piping and</li> </ol>



		<p>instrumentation diagrams</p> <ol style="list-style-type: none"> <li>3. Draw basic flow sheet layouts</li> <li>4. Prepare flow sheet (Piping and Instrumentation) diagrams</li> </ol>
74236	Plant Design & Drawing	<ol style="list-style-type: none"> <li>1. Acquire the knowledge of process flow diagram</li> <li>2. Draw a piping and instrumentation diagram</li> <li>3. Understand the plant layouts and elevations</li> <li>4. Known the arrangement of tank, piping isometrics and stress analysis</li> </ol>
74237	Seminar	<ol style="list-style-type: none"> <li>1. Gain self-confidence about their career path in their selected domain</li> <li>2. Prepare for any presentation due to increased confidence and practiced soft skills</li> <li>3. Develop their overall personality by carving their presentation, aptitude and research skills</li> <li>4. Work in a team for the benefit of their organization and the society</li> <li>5. Set themselves for lifelong learning approach</li> </ol>
74238	Major Project-Phase II	<ol style="list-style-type: none"> <li>1. Apply their fundamental knowledge for demonstrating the depth technical competency in the area of chemical engineering</li> <li>2. Have the hands on exposure for design of equipment related to their project work</li> <li>3. Apply oral, graphical and written communication in both technical and non-technical environment</li> </ol>
74239	Professional Ethics	<ol style="list-style-type: none"> <li>1. Realize the role of engineers towards society and environment</li> <li>2. Demonstrate ethical practices and responsibility as a professional</li> <li>3. Take ethical judgments and solve problems</li> <li>4. Develop engineers attitude with sharing of values</li> </ol>