

<b>CRITERION 7</b>	<b>Continuous Improvement</b>	<b>75</b>
<b>Marks Claimed</b>		<b>70</b>

### 7.1. Actions taken based on the results of evaluation of each of the POs & PSOs (30)

<b>Claimed 28</b>
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As discussed in the Criterion 2, the chemical engineering department has set the attainment levels of POs and PSOs at 65%, 65% and 70% of average CO-PO & CO-PSO mapping values as target levels for the Academic Years 2017-2018, 2018-2019 and 2019-2020 respectively.

#### POs & PSOs Attainment Levels and Actions for improvement – Academic Year 2019-20

POs	Target Level	Attainment Level	Observations
<b>PO1: Engineering Knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.			
<b>PO 1</b>	<b>1.82</b>	<b>1.90</b>	Chemical engineering curriculum requires the strong foundation of theoretical and practical knowledge of science and mathematics, which the students study during their entire programme, especially in their first year, but improvement in correlating the theoretical concepts with applications is required. Target Attainment level has been reached. The following actions were taken to improve the attainment level
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. Students were encouraged to actively participate in technical events, other events where their basic knowledge should be applied in complex Engineering problems.</li> <li>2. Mathematics based courses have been added in the curriculum so that students develop the knack of attempting and solving the complex Engineering problems.</li> </ol>			
<b>PO2: Problem Analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.			

PO 2	1.60	1.74	The problem solving and analysis skills gained at first and second semester level courses helped the students to learn various techniques and to apply same in real application areas. Target Attainment level has been reached. The following actions were taken to improve the attainment level
<b>Actions taken</b> <ol style="list-style-type: none"> <li>1. Students were encouraged to observe the real life engineering problems faced by the society in general and to gain insight into possible approaches/solutions.</li> <li>2. Students were encouraged to the review research literature to explore and analyze complex engineering problems faced world over.</li> </ol>			
<b>PO3: Design/Development of Solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.			
PO 3	1.56	1.69	Projects undertaken by students lacked strong social relevance and concern to environmental issues. Target Attainment level has been reached. The following actions were taken to improve the attainment level
<b>Actions taken</b> <ol style="list-style-type: none"> <li>1. Students were encouraged to include in their B.Tech projects the standard parameters and the constraints pertaining to safety, societal, and environmental considerations in designing such projects.</li> <li>2. Design of solutions for complex engineering problems of the public health and safety, culture, society and environmental considerations were encouraged to be undertaken by the B.Tech students.</li> </ol>			
<b>PO4: Conduct Investigations of Complex Problems:</b> 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 for complex problems.			
PO 4	1.45	1.41	It was observed that most of the investigations/projects were

			addressing the core research areas. Target Attainment level has been reached up-to a large extent. The following actions were taken to improve the attainment level
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. Research oriented final year B.Tech Projects undertaken by students were encouraged to develop and hone their research skills further.</li> <li>2. Students were motivated to participate in technical events/workshops/STC's/Online lectures conducted by the Department/sister departments to impart more knowledge &amp; research methods to formulate innovative solutions to complex Chemical Engineering Problems.</li> </ol>			
<b>PO5: Modern Tool Usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.			
<b>PO 5</b>	<b>1.36</b>	<b>1.15</b>	Up gradation of resources and modern tools is fundamental to drive meaningful research and meet industry standards. Target Attainment level has been reached to a certain extent. The following actions are made in order to sustain this attainment level.
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. Labs were modernized &amp; developed by including some modern analytical &amp; computational equipments /tools like TGA, FTIR, CHNS Analyzer, HPLC, ASPEN Plus, etc.</li> <li>2. Students were encourage to use some latest version software's like MATLAB ,FLUENT and IT tools in sister Departments like Electrical Engineering, Mathematics and Mechanical Engineering. etc.</li> </ol>			
<b>PO6: The Engineer and Society:</b> 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.			
<b>PO 6</b>	<b>1.40</b>	<b>1.23</b>	The courses of Chemical Engineering need to address the needs of health, safety and social

			<p>concerns regarding engineering practices in real life.</p> <p>Target Attainment level has been reached to a certain extent. The following actions were taken to improve the attainment level</p>
<p><b>Actions taken</b></p> <ol style="list-style-type: none"> <li>1. Students were encouraged to take up industry related projects for their professional growth and to understand the safety, environmental &amp; social aspects of process industries.</li> <li>2. Some mandatory humanities courses were introduced in the curriculum to ensure that students are repeatedly reminded of their social responsibilities to serve in future as professional Chemical engineers.</li> </ol>			
<p><b>P07: Environment and Sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.</p>			
<b>PO 7</b>	<b>1.50</b>	<b>1.19</b>	<p>The issues of global and environmental awareness among the students needed to be improved.</p> <p>Target Attainment level has been reached up-to certain extent. The following actions were taken to improve the attainment level</p>
<p><b>Actions taken.</b></p> <ol style="list-style-type: none"> <li>1. Technical workshops related to environmental issues &amp; renewable energy were conducted by the Department.</li> <li>2. The main emphasis on the projects for the locally available energy resources.</li> <li>3. Projects addressing the global energy issues were undertaken up by the students with a focus on consumption, utilization &amp; proper management of energy.</li> </ol>			
<p><b>P08: Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.</p>			
<b>PO 8</b>	<b>1.32</b>	<b>0.90</b>	<p>Communications and other ethical/moral knowledge needed to be improved.</p> <p>Target Attainment level has been reached up-to some extent. The following actions were taken to improve the attainment level</p>

<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>Motivational talks, lectures regarding ethical practices were held in the Department</li> <li>Students were offered courses from humanities like "Ethics and Self Awareness" syllabus of which was based on ethics and sociology.</li> </ol>			
<b>P09: Individual and Team Work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings			
<b>PO 9</b>	<b>1.32</b>	<b>0.98</b>	Ability to work as team, with coordination found to be lacking. Target Attainment level has been reached up-to some extent. The following actions were taken to improve the attainment level
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>At institute level various cultural programs and alumni meetings were held where students were encouraged to work as volunteers/ organizer. This provided them with a platform/opportunity to work as individuals as well as in groups and thus helping them to groom their skills to emerge as a leader with high team spirits.</li> <li>The laboratory work of the students is conducted by framing student groups so that students learn to work in a team environment</li> </ol>			
<b>PO10: Communication:</b> 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			
<b>PO 10</b>	<b>1.53</b>	<b>1.06</b>	Presentations and report writing skills and communication skills required to be further improved among the students. Target Attainment level has been reached up-to some extent. The following actions were taken to improve the attainment level
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>Group discussions, seminars, presentations and soft skills training programs were organized to enhance the communication skills.</li> <li>Regular seminars and presentations were conducted as part of curriculum with separate credit points like Industrial training presentation (ITP) and seminars to help students communicate their technical ideas.</li> </ol>			
<b>PO11: Project Management and Finance:</b> 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.			

<b>PO 11</b>	<b>1.36</b>	<b>1.10</b>	Managerial principles to students work were needed to be inculcated in students by introduction of various courses underlining these principles. Target Attainment level has been reached up-to certain extent. The following actions were taken to improve the attainment level.
<b>Actions taken</b>			
1. The awareness was generated in students regarding managerial principles and projects by introducing some core courses like "Human Resource Development, Managerial Economics for Engineers and Basic Management Principles related to management, economics and organization of process industries.			
<b>PO12: Life-long Learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.			
<b>PO 12</b>	<b>1.50</b>	<b>1.47</b>	The curriculum scheme of the B.Tech program imparts knowledge of contemporary issues only. Target Attainment level has been reached to a large extent. The following actions were taken to improve the attainment level.
<b>Actions taken</b>			
1. Through introduction of advanced level courses like Nano-Science and Technology, Fuel Cell Technology, Computational Fluid Dynamics etc that were expected to hold relevance throughout their careers, and learning skills having long term benefits.			
2. Encourage the teachers to highlights the allied areas of chemical engineering to keep pace with the latest developments in the area of Chemical Engineering.			

*Table B.7.1a*

<b>PSO1:</b> Apply the principles and practices of Chemical Engineering discipline along with the basic sciences and humanities to solve the complex engineering problems concerning the issues of environment, safety, economics, culture and society			
<b>PSO1</b>	<b>1.69</b>	<b>1.74</b>	Target Attainment level has been reached. The following actions were taken to improve the attainment level

<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. Exposure of students to various sophisticated analytical tools/equipment's to motivate them to undertake projects on burning issue in Chemical Engineering.</li> <li>2. Students are encouraged to coordinate with Innovation and Entrepreneurship cell of the Institute to develop entrepreneurship skills concerning the issues of environment, safety, economics, culture and society.</li> </ol>			
<b>PSO2:</b> Acquire and apply the new knowledge with professional responsibility and ethics towards the advancement of academic and research pursuits in chemical and allied disciplines in the societal contexts.			
<b>PSO2</b>	<b>1.47</b>	<b>1.61</b>	Target Attainment level has been reached. The following actions were taken to improve the attainment level
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. Students were offered courses from humanities like "Ethics and Self Awareness" syllabus of which was based on ethics and sociology.</li> <li>2. Students were encouraged to take up industry related projects for their professional growth and to understand the safety, environmental &amp; social aspects of process industries.</li> </ol>			
<b>PSO3:</b> Design, develop and modify the chemical processes and to analyze these by applying the physicochemical and biological techniques.			
<b>PSO3</b>	<b>1.45</b>	<b>1.56</b>	Up gradation of resources and modern tools is fundamental to drive meaningful research and meet industry standards. Target Attainment level has been reached. The following actions were taken to improve the attainment level
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. Students are motivated to take up the real life problems during the project work with the focus on industrial pollution, its effects and proper remedies .Special attention is paid towards environment and energy conservation.</li> </ol>			

*Table B.7.1b***POs & PSOs attainment levels and actions for improvement – Academic Year 2018-19**

<b>POs</b>	<b>Target Level</b>	<b>Attainment Level</b>	<b>Observations</b>
<b>PO1: Engineering Knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.			
<b>PO 1</b>	<b>1.73</b>	<b>1.75</b>	Chemical engineering curriculum requires the strong foundations of theoretical and practical knowledge of science and mathematics, same

			<p>is needed by the students during their study in entire programme. Improvement in correlating the theoretical concepts with applications is required.</p> <p>Target Attainment level has been reached. The following actions were taken to improve the attainment level.</p>
<p><b>Actions taken</b></p> <ol style="list-style-type: none"> <li>1. Students were encouraged to actively participate in technical and other events where their basic knowledge was required to be applied in solving complex Engineering problems.</li> <li>2. Mathematics based courses have been added in the curriculum so that students develop the knack of attempting and solving the complex Engineering problems taking advantage of same.</li> <li>3. Major core courses were introduced in 2<sup>nd</sup> and 3<sup>rd</sup> year of the B. Tech curriculum, so that students develop the ability to take up the B. Tech projects involving the complex engineering problem.</li> </ol>			
<p><b>PO2: Problem Analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.</p>			
<b>PO 2</b>	<b>1.51</b>	<b>1.54</b>	<p>The problem solving and analysis skills gained at first and second semester level courses helped the students to learn various techniques and to apply same in real application areas.</p> <p>Target Attainment level has been reached. The following actions were taken to improve the attainment level</p>
<p><b>Actions taken</b></p> <ol style="list-style-type: none"> <li>1. Students were encouraged to visit various process industries in the country which helped them to gain firsthand knowledge about various technical problems faced by such industry.</li> <li>2. Students were encouraged to observe the real life engineering problems faced by the society in general and to gain insight into possible approaches/solutions.</li> <li>3. Students were encouraged to the review research literature to explore and analyze complex engineering problems faced world over.</li> <li>4. Relevant techniques of mathematics, natural sciences and engineering sciences were used by the students in problem solving.</li> </ol>			



<b>PO3: Design/Development of Solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.			
<b>PO 3</b>	<b>1.44</b>	<b>1.50</b>	Projects undertaken by students initially lacked strong social relevance and concern to environmental issues. Target Attainment level has been reached. The following actions were taken to improve the attainment level
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. Students were encouraged to include in their B.Tech projects the standard parameters and the constraints pertaining to safety&amp; sustainability in designing etc of such projects.</li> <li>2. New course on Safety titled "Chemical Process Safety "was introduced in curriculum at 7<sup>th</sup> semester level ".</li> <li>3. Design of solutions for complex engineering problems of the public health and safety, culture, society and environmental considerations were encouraged to be undertaken by the B.Tech students.</li> </ol>			
<b>PO4: Conduct Investigations of Complex Problems:</b> 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 for complex problems.			
<b>PO 4</b>	<b>1.36</b>	<b>1.24</b>	It was observed that most of the investigations/projects undertaken were addressing the core research areas lacking in taking up case studies. Target Attainment level has been reached up-to a large extent. The following actions were taken to improve the attainment level
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. The faculty of the Department participated in the high level discussions /meetings at state and national level to provide their inputs of research-based knowledge, research methods and design of experiments to solve the complex case study problems.</li> <li>2. Research oriented final year B.Tech Projects were undertaken by students who were encouraged to develop and hone their research skills further.</li> <li>3. Technical events/workshops/STC's/Online lectures were conducted by the Department to impart more knowledge &amp; research methods to stake holders to formulate innovative solutions to complex Chemical Engineering Problems.</li> </ol>			
<b>PO5: Modern Tool Usage:</b> Create, select, and apply appropriate techniques, resources, and modern			

engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.			
<b>PO 5</b>	<b>1.23</b>	<b>1.17</b>	<p>Up gradation of resources and modern tools is fundamental to drive meaningful research and meet the industry demands/ standards.</p> <p>Target Attainment level has been reached up-to a large extent. The following actions were made in order to sustain this attainment level.</p>
<p><b>Actions taken</b></p> <ol style="list-style-type: none"> <li>1. Labs were modernized &amp; developed by including some modern analytical &amp; computational equipments /tools like TGA, FTIR, CHNS Analyzer, HPLC, ASPEN Plus, etc.</li> <li>2. Students were encouraged to use some latest version software's like MATLAB , FLUENT and IT tools in sister Departments like Electrical Engineering. , Mathematics and Mechanical Engineering. etc.</li> <li>3. Modeling of complex engineering problems with latest version software's like FLUENT was undertaken in sister Departments like Mechanical Engineering.</li> </ol>			
<p><b>PO6: The Engineer and Society:</b> 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.</p>			
<b>PO 6</b>	<b>1.35</b>	<b>1.13</b>	<p>Chemical Engineering curriculum needs to address the issues of health, safety and social concerns in engineering practices faced in real life.</p> <p>Target Attainment level has been reached to a certain extent. The following actions were taken to improve the attainment level</p>
<p><b>Actions taken</b></p> <ol style="list-style-type: none"> <li>1. Students were encouraged to take up industry related projects involving the safety, environmental &amp; Social aspects for their complete professional growth.</li> <li>2. Some mandatory humanities courses were introduced in the curriculum to ensure that students are repeatedly reminded of their social responsibilities to become responsible citizens in future possessing high professional qualities.</li> <li>3. Relevant courses in Curriculum were introduced in scheme to assess the societal, health and safety concerns and also the consequent responsibilities relevant to the professional engineering practice.</li> </ol>			

<b>P07: Environment and Sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.			
<b>PO 7</b>	<b>1.38</b>	<b>1.08</b>	The issues of global environmental awareness among the students should be improved. Target Attainment level has been reached up-to some extent. The following actions were taken to improve the attainment level
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. The faculty of the Department participated in the high level discussions /meetings at state and national level to provide their inputs of research-based knowledge and research methods and design of experiments to solve the complex problems pertaining to environment and social issues.</li> <li>2. Research oriented final year B.Tech Projects undertaken by students were focusing the environmental and societal issues.</li> <li>3. Projects addressing the global energy issues were undertaken up by the students with a focus on consumption, utilization &amp; proper management of energy.</li> <li>4. Technical workshops related to environmental issues &amp; renewable energy was conducted by the Department.</li> <li>5. The main emphasis on the projects for the locally available energy resources.</li> </ol>			
<b>P08: Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.			
<b>PO 8</b>	<b>1.24</b>	<b>0.84</b>	Communications and other ethical/moral knowledge needed to be improved. Target Attainment level has been reached up-to some extent. The following actions were taken to improve the attainment level
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. Motivational talks and lectures regarding ethical practices were held in the Department</li> <li>2. Students were offered courses from humanities Department based on Ethics and Self Awareness, syllabus of which was mostly based on ethics and sociology.</li> </ol>			
<b>P09: Individual and Team Work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings			
<b>PO 9</b>	<b>1.21</b>	<b>0.88</b>	Ability to work as team, with

			coordination was found to be lacking. Target Attainment level has been reached up-to some extent. The following actions were taken to improve the attainment level
<p><b>Actions taken</b></p> <ol style="list-style-type: none"> <li>To help the students to groom their skills to emerge as effective leaders, team work was encouraged. Various programs and counseling sessions were organized on departmental level.</li> <li>Various professional students' chapter activities like IChE student chapter were held in order to hone their abilities to emerge as a effective team members.</li> <li>At institute level various cultural programs and alumni meetings were held where students were encouraged to work as volunteers/ organizers. This provided them with a platform/opportunity to work in individual's capacity as well as in groups and thus helping them to groom their skills to emerge as a leader with high team spirits.</li> </ol>			
<p><b>PO10: Communication:</b> 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</p>			
<b>PO 10</b>	<b>1.37</b>	<b>1.01</b>	Presentations and report writing and communication skills required to be further improved among the students. Target Attainment level has been reached up-to some extent. The following actions were taken to improve the attainment level
<p><b>Actions taken</b></p> <ol style="list-style-type: none"> <li>Group discussions, seminars, presentations and soft skills training programs were organized to enhance the communication skills.</li> <li>Regular seminars and presentations were conducted as part of curriculum with separate credit points like Industrial training presentation (ITP) and seminars to help students communicate their technical ideas.</li> </ol>			
<p><b>PO11: Project Management and Finance:</b> 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.</p>			
<b>PO 11</b>	<b>1.29</b>	<b>0.95</b>	Managerial principles to students work were needed to be inculcated

			<p>in students by introduction of various courses underlining these principles.</p> <p>Target Attainment level has been reached up-to some extent. The following actions were taken to improve the attainment level</p>
<p><b>Actions taken</b></p> <ol style="list-style-type: none"> <li>1. The awareness was generated in students regarding managerial principles and projects by introducing some core courses like Human Resource Development, Managerial Economics for Engineers and Basic Management Principles related to management, economics and organization of process industries.</li> <li>2. Students were encouraged to undertake B.Tech projects based on their own current work and research to be an effective team member and emerge the leader of team. Students managed and achieved targets in such projects working in multidisciplinary environments like work in other sister Departments of institute, industry and both genders working together.</li> </ol>			
<p><b>PO12: Life-long Learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.</p>			
<b>PO 12</b>	<b>1.37</b>	<b>1.69</b>	<p>The curriculum scheme of the B.Tech program imparted knowledge with no scope of life-long learning.</p> <p>Target Attainment level has been reached. The following actions were taken to improve the attainment level</p>
<p><b>Actions taken</b></p> <ol style="list-style-type: none"> <li>1. Through introduction of advanced level courses in emerging fields like Nano-Science and Technology, Fuel Cell Technology, Computational Fluid Dynamics etc that were expected to hold relevance throughout their careers and have potential to be in touch with the Department after passing out. The learning skills in industry related core courses are expected to have long term benefits.</li> <li>2. Encourage the teachers to highlights the allied areas of chemical engineering to keep pace with the latest developments in the area of Chemical Engineering.</li> </ol>			

**Table B.7.1c**

**PSO1:**Apply the principles and practices of Chemical Engineering discipline along with the basic sciences and humanities to solve the complex engineering problems concerning the issues of environment, safety, economics, culture and society

<b>PSO1</b>	<b>1.60</b>	<b>1.83</b>	Students hadn't proper coordination with sister departments like humanities, sciences to use same in solving complex problems. Interaction with the Innovation and Entrepreneurship cell of the Institute might help to shape the entrepreneurship skills. Target Attainment level has been reached. The following actions were taken to improve the attainment level
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. Better coordination with sister departments like humanities and sciences etc.</li> <li>2. Workshops and conferences are being organized frequently to share the concerns of the issues of environment, safety, economics, and society.</li> <li>3. Exposure of students to various sophisticated analytical tools/equipments to motivate them to undertake burning issue in Chemical Engineering.</li> </ol>			
<b>PSO2:</b> Acquire and apply the new knowledge with professional responsibility and ethics towards the advancement of academic and research pursuits in chemical and allied disciplines in the societal contexts.			
<b>PSO2</b>	<b>1.38</b>	<b>1.51</b>	Target Attainment level has been reached. The following actions were taken to improve the attainment level
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. Motivational talks, lectures regarding ethical practices were held in the Department</li> <li>2. Students were offered courses from humanities like Ethics and Self Awareness, syllabus of which was based on ethics and sociology.</li> <li>3. Students were encouraged to take up industry related projects for their professional growth and to understand the safety, environmental &amp; social aspects of process industries.</li> </ol>			
<b>PSO3:</b> Design, develop and modify the chemical processes and to analyze these by applying the physicochemical and biological techniques.			
<b>PSO3</b>	<b>1.30</b>	<b>1.41</b>	Up gradation of resources and modern tools is fundamental to drive meaningful research and meet industry standards. Target Attainment level has been reached. The following actions were taken to improve the attainment level
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. Students are motivated to take up the real life problems during the project work with the focus on industrial pollution, its effects and proper remedies .Special attention is paid towards environment and energy conservation.</li> </ol>			

*Table B.7.1d***POs & PSOs Attainment Levels and Actions for improvement – Academic Year 2017-18**

<b>POs</b>	<b>Target Level</b>	<b>Attainment Level</b>	<b>Observations</b>
<b>PO1: Engineering Knowledge:</b> Apply the knowledge of mathematics, science, engineering			

fundamentals, and an engineering specialization to the solution of complex engineering problems.			
<b>PO 1</b>	<b>1.72</b>	<b>1.81</b>	Chemical engineering curriculum requires the strong foundation of theoretical and practical knowledge of science and mathematics, which the students study during their entire programme, especially in their first year, but improvement in correlating the theoretical concepts with applications is required. Target Attainment level has been reached. The following actions were taken to improve the attainment level
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. Students were encouraged to actively participate in technical events, other events where their basic knowledge should be applied in complex Engineering application.</li> <li>2. Major core courses were introduced in 2nd and 3rd year of the B-tech. curriculum, so that students can develop the ability to take up the complex engineering problem as B-tech projects in the final year.</li> </ol>			
<b>PO2: Problem Analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.			
<b>PO 2</b>	<b>1.49</b>	<b>1.62</b>	The problem solving and analysis skills gained at first and second semester level courses helped the students to learn various techniques and to apply same in real application areas. Target Attainment level has been reached. The following actions were taken to improve the attainment level
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. Students were encouraged to observe the real life engineering problems faced by the society in general and to gain insight into possible approaches/solutions.</li> <li>2. Students were encouraged to the review research literature to explore end analyze complex engineering problems faced world over.</li> </ol>			

<b>PO3: Design/Development of Solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.			
<b>PO 3</b>	<b>1.43</b>	<b>1.64</b>	Projects undertaken by students lacked strong social relevance and concern to environmental issues. Target Attainment level has been almost reached. The following actions were initiated to sustain and improve the attainment level.
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. Students were encouraged to include in their B.Tech projects the standard parameters and the constraints pertaining to safety, societal, and environmental considerations in designing such projects.</li> <li>2. New course on Safety titled "Chemical Process Safety" was introduced in curriculum at 7th semester level "</li> </ol>			
<b>PO4: Conduct Investigations of Complex Problems:</b> 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 for complex problems.			
<b>PO 4</b>	<b>1.33</b>	<b>1.31</b>	It was observed that most of the investigations/projects were addressing the core research areas. Target Attainment level has been reached. The following actions were taken to improve the attainment level.
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. Research oriented final year B.Tech Projects undertaken by students were encouraged to develop and hone their research skills further.</li> <li>2. Technical events/workshops/STC's/Online lectures were conducted by the Department to impart more knowledge &amp; research methods to stake holders to formulate innovative solutions to complex Chemical Engineering Problems.</li> </ol>			
<b>PO5: Modern Tool Usage:</b> Create, select, and apply appropriate techniques, resources, and			



modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.			
<b>PO 5</b>	<b>1.21</b>	<b>1.22</b>	Up gradation of resources and modern tools is fundamental to drive meaningful research and meet industry standards. Target Attainment level has been reached. The following actions were taken to improve the attainment level
<b>Actions taken</b> <ol style="list-style-type: none"> <li>1. Labs were modernized &amp; developed by including some modern analytical &amp; computational equipments /tools like TGA, FTIR, CHNS Analyzer, HPLC, ASPEN Plus, etc.</li> <li>2. Students were encourage to use some latest version software's like MATLAB ,FLUENT and IT tools in sister Departments like Electrical Engineering. , Mathematics and Mechanical Engineering. etc.</li> </ol>			
<b>PO6: The Engineer and Society:</b> 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.			
<b>PO 6</b>	<b>1.31</b>	<b>1.18</b>	The courses of Chemical Engineering need to address the needs of health, safety and social concerns regarding engineering practices in real life. Target Attainment level has been reached up-to a large extent. The following actions were taken to improve the attainment level
<b>Actions taken</b> <ol style="list-style-type: none"> <li>1. Students were encouraged to take up industry related projects for their professional growth and to understand the safety, environmental &amp;social aspects of process industries.</li> <li>2. Some mandatory humanities courses were introduced in the curriculum to ensure that students are repeatedly reminded of their social responsibilities to serve in future as professional Chemical engineers.</li> </ol>			
<b>P07: Environment and Sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.			

<b>PO 7</b>	<b>1.35</b>	<b>1.18</b>	The issues of global and environmental awareness among the students should be improved. Target Attainment level has been reached. The following actions were taken to improve the attainment level
<b>Actions taken.</b> <ol style="list-style-type: none"> <li>1. Research oriented final year B. Tech Projects undertaken by students were focusing the environmental and societal issues.</li> <li>2. Technical workshops related to environmental issues &amp; renewable energy was conducted by the Department.</li> <li>3. The main emphasis on the projects for the locally available energy resources.</li> </ol>			
<b>PO8: Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.			
<b>PO 8</b>	<b>1.23</b>	<b>0.88</b>	Communications and other ethical/moral knowledge needed to be improved. Target Attainment level has been reached. The following actions were taken to improve the attainment level
<b>Actions taken</b> <ol style="list-style-type: none"> <li>1. Motivational talks, lectures regarding ethical practices were held in the Department</li> <li>2. Students were offered courses from humanities like "Ethics and Self Awareness" syllabus of which was based on ethics and sociology.</li> </ol>			
<b>PO9: Individual and Team Work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings			
<b>PO 9</b>	<b>1.22</b>	<b>0.87</b>	Ability to work as team, with coordination found to be lacking. Target Attainment level has been reached up-to some extent. The following actions were taken to improve the attainment level
<b>Actions taken</b> <ol style="list-style-type: none"> <li>1. Various professional students' chapter activities like IChE student chapter were conducted to hone their abilities to emerge as an effective member in the team.</li> <li>2. At institute level various cultural programs and alumni meetings were held where students were encouraged to work as volunteers/ organizer. This provided them with a</li> </ol>			

platform/opportunity to work as individuals as well as in groups and thus helping them to groom their skills to emerge as a leader with high team spirits.			
<b>PO10: Communication:</b> 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			
<b>PO 10</b>	<b>1.40</b>	<b>0.96</b>	Presentations and report writing skills and communication skills required to be further improved among the students. Target Attainment level has been reached up-to some extent. The following actions were taken to improve the attainment level
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. Group discussions, seminars, presentations and soft skills training programs were organized to enhance the communication skills.</li> <li>2. Regular seminars and presentations were conducted as part of curriculum with separate credit points like Industrial training presentation (ITP) and seminars to help students communicate their technical ideas.</li> </ol>			
<b>PO11: Project Management and Finance:</b> 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.			
<b>PO 11</b>	<b>1.30</b>	<b>0.89</b>	Managerial principles to students work were needed to be inculcated in students by introduction of various courses underlining these principles. Target Attainment level has been reached up-to some extent. The following actions were taken to improve the attainment level.
<b>Actions taken</b>			
<ol style="list-style-type: none"> <li>1. The awareness was generated in students regarding managerial principles and projects by introducing some core courses like "Human Resource Development, Managerial Economics for Engineers and Basic Management Principles related to management, economics and organization of process industries.</li> </ol>			
<b>PO12: Life-long Learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.			

<b>PO 12</b>	<b>1.36</b>	<b>1.49</b>	<p>The curriculum scheme of the B.Tech program imparts knowledge of contemporary issues only.</p> <p>Target Attainment level has been reached. The following actions were taken to improve the attainment level</p>
<p><b>Actions taken</b></p> <ol style="list-style-type: none"> <li>1. Through introduction of advanced level courses like Nano-Science and Technology, Fuel Cell Technology, Computational Fluid Dynamics etc that were expected to hold relevance throughout their careers, and learning skills having long term benefits.</li> </ol>			

*Table B.7.1e*

<p>PSO1:Apply the principles and practices of Chemical Engineering discipline along with the basic sciences and humanities to solve the complex engineering problems concerning the issues of environment, safety, economics, culture and society</p>			
<b>PSO1</b>	<b>1.57</b>	<b>1.80</b>	<p>Target Attainment level has been reached. The following actions were taken to improve the attainment level</p>
<p><b>Actions taken</b></p> <ol style="list-style-type: none"> <li>1. Workshops and conferences are being organized frequently to share the concerns of the issues of environment, safety, economics, and society.</li> <li>2. Exposure of students to various sophisticated analytical tools/equipments to motivate them to undertake burning issue in Chemical Engineering.</li> <li>3. Students are encouraged to coordinate with Innovation and Entrepreneurship cell of the Institute to develop entrepreneurship skills.</li> </ol>			
<p>PSO2:Acquire and apply the new knowledge with professional responsibility and ethics towards the advancement of academic and research pursuits in chemical and allied disciplines in the societal contexts.</p>			
<b>PSO2</b>	<b>1.40</b>	<b>1.52</b>	<p>Target Attainment level has been reached. The following actions were taken to improve the attainment level</p>
<p><b>Actions taken</b></p> <ol style="list-style-type: none"> <li>1. Students were offered courses from humanities like "Ethics and Self Awareness" syllabus of which was based on ethics and sociology.</li> <li>2. Students were encouraged to take up industry related projects for their professional growth and to understand the safety, environmental &amp;social aspects of process industries.</li> </ol>			
<p>PSO3: Design, develop and modify the chemical processes and to analyze these by applying the physicochemical and biological techniques.</p>			
<b>PSO3</b>	<b>1.30</b>	<b>1.39</b>	<p>Up gradation of resources and modern tools is fundamental</p>

			to drive meaningful research and meet industry standards. Target Attainment level has been reached. The following actions were taken to improve the attainment level
<b>Actions taken</b>			
1. Students are motivated to take up the real life problems during the project work with the focus on industrial pollution, its effects and proper remedies .Special attention is paid towards environment and energy conservation.			

Table B.7.1f

## 7.2 Academic Audit and actions taken during the period of Assessment (15)

Claimed 14

## 7.2.1. Details of the Assessment based on conduct and actions taken in relation to continuous Improvement, Academic Year 2019-2020

## (a) Course files Evaluation

Frequency	Conduct Mechanism	Action Plan	Implementation
DUGC and PAC will be meeting at least twice in a semester.	<p>The DUGC Convenor/PAC during their random checks of the lecture halls, observe and check the mode of delivery of course material by a concerned faculty member. Emphasis will given to the delivery of lectures as per the lesson plan, teaching aids used, communication skills and classroom management etc.</p> <p>2. Regular analysis of the results of mid-term and major examinations of all subjects is done..</p>	Faculty members incorporate changes suggested by the DUGC and PAC for any gaps and recommends actions to be initiated to ensure quality deliverables.	<p>1. Faculty members have to match the pace of their deliverables as per the students requirements as well as they have to schedule the lecture plans in such a way that the syllabus is completed in time. To achieve this they can arrange extra lectures on appropriate times.</p> <p>2. Each faculty member is encouraged to undergo at least one FDP per year. The FDP is mainly focussed to improve the communication skills and to train the faculty in improvised methods of teaching-learning.</p> <p>3. Regular analysis of the results of mid-term and major examinations of all subjects is done and concerned faculty is guided to initiate necessary actions.</p> <p>4. Remedial classes are</p>

			scheduled in reference to academic progress of the student, who appear for supplementary examinations
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Table B.7.2.1a

**(b) Lectures/ Lab Evaluation**

Frequency	Conduct Mechanism	Action Plan	Implementation
DUGC and PAC will be meeting at least twice in a semester.	<p>1. The committee performs audit of laboratory files i.e. verify the contents of the lab course file, experimental plan, evaluation procedure etc.</p> <p>2. The PAC takes random checks of the laboratories during experiments to get ready information to assess the quality of the delivery and evaluation.</p> <p>3. Moreover a safety audit is conducted by the PAC in addition to the conduct of laboratory experiments in proper and fruitful manner.</p>	The parameters are assessed to ensure the teaching methods of benchmarked standards are being used throughout the institute. Feedback is communicated to the concerned faculty member.	Each faculty member is encouraged to undergo at least one FDP per year. The FDP is mainly focussed to improve the communication skills and to train the faculty in improvised methods of Experimentation & exposure to newer techniques of analysis. The FDPs are carried out at the institute level itself by the learning and development team mainly sponsored under TEQIP-III.

Table B.7.2.1b

**No Academic Audit was carried out due to following reasons:**

1. The abrogation of Article 370 in J&K state by the Central Government and remaining incommunicado for around six months following August 5, 2019.
2. The surge of COVID-19 cases and subsequent lockdown of the whole country from March-2020 till August-2020.

### 7.2.2. Details of the Assessment based on conduct and actions taken in relation to continuous Improvement, Academic Year 2018-2019

#### (a) Course files Evaluation

Frequency	Conduct Mechanism	Action Plan	Implementation
DUGC and PAC will be meeting at least twice in a semester.	<p><b>1</b> The DUGC Convenor/PAC during their random checks of the lecture halls, observe and check the mode of delivery of course material by a concerned faculty member. Emphasis will given to the delivery of lectures as per the lesson plan, teaching aids used, communication skills and classroom management etc.</p> <p><b>2.</b> Regular analysis of the results of mid-term and major examinations of all subjects is done.</p>	Faculty members incorporate changes suggested by the DUGC and PAC for any gaps and recommends actions to be initiated to ensure quality deliverables.	<p><b>1.</b> Faculty members have to match the pace of their deliverables as per the students requirements as well as they have to schedule the lecture plans in such a way that the syllabus is completed in time. To achieve this they can arrange extra lectures on appropriate times.</p> <p><b>2.</b> Each faculty member is encouraged to undergo at least one FDP per year. The FDP is mainly focussed to improve the communication skills and to train the faculty in improvised methods of teaching-learning.</p> <p><b>3.</b> Regular analysis of the results of mid-term and major examinations of all subjects is done and concerned faculty is guided to initiate necessary actions.</p> <p><b>4.</b> Remedial classes are scheduled in reference to academic progress of the student, who appear for supplementary examinations</p>

*Table B.7.2.2a*

**(b) Lectures/ Lab Evaluation**

<b>Frequency</b>	<b>Conduct Mechanism</b>	<b>Action Plan</b>	<b>Implementation</b>
DUGC and PAC will be meeting at least twice in a semester.	<p>1. The committee performs audit of laboratory files i.e. verify the contents of the lab course file, experimental plan, evaluation procedure etc.</p> <p>2. The PAC takes a random checks of the laboratories during experiments to get ready information to assess the quality of the delivery and evaluation.</p> <p>3. Moreover a safety audit is conducted by the PAC in addition to the conduct of laboratory experiments in proper and fruitful manner.</p>	The parameters are assessed to ensure the teaching methods of benchmarked standards are being used throughout the institute. Feedback is communicated to the concerned faculty member.	Each faculty member is encouraged to undergo at least one FDP per year. The FDP is mainly focussed to improve the communication skills and to train the faculty in improvised methods of Experimentation & exposure to newer techniques of analysis. The FDPs are carried out at the institute level itself by the learning and development team mainly sponsored under TEQIP-III.

*Table B.7.2.2b***(c) Academic Audit Report through External Experts**

In addition to the above exercise an academic audit by an expert committee from outside the institute was initiated from the year 2017 onwards. The report and the actions taken are summarised as under:

**Auditors Names:**

1. Dr. G. A. Wani

Professor & Ex. Head, Department of Chemical Engg., N.I.T Srinagar.

2. Dr. M. A. Baba

Professor & Ex. Head, Department of Chemical Engg., N.I.T Srinagar



## Date of Audit: 04-05-2019

<i>Proposed</i>	<i>Action</i>
Purchasing of few sophisticated instruments like: GC, TGA, FTIR, GC-MS, HPLC, FE_SEM, X-RD, Ion chromatography, COD Analyser, TOC analyser, pore area distribution analyser.	TGA (order placed) COD Analyser purchased GC-MS in pipeline under CRFC DO/PH/Ion Meter purchased CHNS Analyser purchased FTIR purchased HPLC purchased
The trend started by department faculty members of publishing research papers in reputed journals like Elsevier, ACS, Taylor-Francis should be encouraged amongst PhD and M.Tech students.	The trend has been taken initiated as suggested and for details of published papers given in criteria 5.
The department should initiate interaction with industries present in J&K as well as other parts of the country in form of lectures from industrial personnel, academia-industry interaction sessions/workshops.	The department has initiated conducting workshop / STC's etc. In last 3 years 3 STC's and 2 workshops were conducted Following are the details Coordinated a one day workshop on Process Safety on 8 <sup>th</sup> of June 2017 Coordinated five day national level workshop on Environment title "Connecting people to nature-CPTN-17" from 25-29 <sup>th</sup> Sep., 2017. Coordinated five day workshop on Process Control from 13 <sup>th</sup> to 17 <sup>th</sup> of November 2017 Coordinated five days S.T.C on Transport Process in Jan-2018.
Efforts should be made to Interact students with visiting faculties from eminent industries and academia.	The suggestion has been widely implemented. Following are the details of visiting faculties and industry persons: Mr. Junaid Ashraf, IOCL Dr. I.M. Mishra, IIT/ISM Dhanbad Dr. V.C. Srivastava, IIT Roorkee Dr. M.K. Jha, NIT Jalandhar Dr. Jatindra Sangwai, IIT Madras Mr. Parvaiz Qalander, Ex. GM JK Cements
Computational facilities of the department should	Purchase of software is in pipeline (Tendered)

<p>further be augmented with addition of high end computational facilities, cluster computing, servers, etc. A full high end computer lab with chemical engineering related softwares such as ANSYS, ASPEN PLUS, COMSOL, GEMS, MATLAB, MATHEMATICA, MAPPLE, STATISTICA etc should be established. Moreover both undergrad and postgrad students should be given projects that would acquaint them with these softwares, to increase there employability and motivate them to further research</p>	
<p>Books in the central library regarding Chemical Engineering should be increased. Further, the students may be issued six textbooks for the entire semester, three references and research books for maximum 15 days. Digitisation of library may be done on priority basis and linked to the department computers.</p>	<p>Implemented as proposed/suggested.</p>
<p>Subscription to chemical engineering journals should be increased for benefit of research students and faculty.</p>	<p>Implemented as suggested</p>
<p>Effort should be made to submit a proposal to IChE (Indian Institute of Chemical Engineers)headquarters, Kolkata for opening a new Srinagar regional centre with its headquarters at NIT Srinagar.</p>	<p>The chapter of IChE is already in place. However we are in a process of submitting the proposal for regional centre of IChE at NIT SRINAGAR. Recently on 30-12-2019, Dr. Jha, Hon. Treasurer IChE visited the department and worked out the possibilities for the same.</p>
<p>It is recommended that provision may be made to admit against vacant seats for M.Tech. program of Chemical Engineering, based on written examination to be conducted by the Institute.</p>	<p>Proposal in this regard stand submitted before senate for approval.</p>
<p>It's recommended that more number of research scholars unfilled in other departments, may be transferred to the department of Chemical Engineering till increase in number of PhD scholars.</p>	<p>Proposal approved. The number of PhD scholars has increased to a large extent.</p>
<p>Renovation of all laboratories of the department may be initiated with floor tiling, False-ceiling</p>	<p>Done in most of the cases. Energy Engineering Lab.</p>

and air conditioners, wherever necessary, on priority basis.	Environmental Engg. Lab. Membrane Laboratory. Biochemical Engineering Lab. Catalysis lab. Rheology & Two phase flow lab
There is an urgent need of submission of sponsored research proposals by the department faculty members to various central and state funding agencies like DST, CSIR, MHRD, MOEF, DAE, DRDO, Council of Science and Technology J&K, etc.	One project sanctioned by MHRD (Briquetting of Dal Lake weeds to be used as fuel source) Total Budget: 23.94 Lacks. D.O.C: Jan.-2018.  Others in pipeline...

Table B.7.2.2c

### 7.2.3. Details of the Assessment based on conduct and actions taken in relation to continuous Improvement, Academic Year 2017-2018

#### (a) Course files Evaluation

Frequency	Conduct Mechanism	Action Plan	Implementation
DUGC and PAC will be meeting at least twice in a semester.	The DUGC Convenor/PAC during their random checks of the lecture halls, will observe and check the mode of delivery of course material by a concerned faculty member. Emphasis is given to the delivery of lectures as per the lesson plan, teaching aids used, communication skills and classroom management etc.  2. Regular analysis of the results of mid-term and major examinations of all subjects is done.	Faculty members incorporate changes suggested by the DMC and PAC for any gaps and suggest and recommend actions to be initiated to ensure quality deliverables.	1. Faculty members have to match the pace of their deliverables as per the student's requirements as well as they have to schedule the lecture plans in such a way that the syllabus is completed on time. To achieve this they can arrange extra lectures on appropriate times.  2. Each faculty member is encouraged to undergo at least one FDP per year. The FDP is mainly focussed to improve the communication skills and to train the faculty in improvised methods of teaching-learning.  3. Regular analysis of the results of mid-term and major examinations of all subjects is done and concerned faculty is guided to initiate necessary

			actions.  4. Remedial classes are scheduled in reference to academic progress of the student, who appear for supplementary examinations
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Table B.7.2.3a

**(b) Lectures/ Lab evaluation**

Frequency	Conduct Mechanism	Action Plan	Implementation
DUGC and PAC will be meeting at least twice in a semester.	<p>1. The committee performs audit of lab course files i.e. verify the contents of the course file, lesson plan, extra material lecture notes, evaluation procedure etc.</p> <p>2. Moreover a safety audit is conducted by the PAC in addition to the conduct of laboratory experiments in proper and fruitful manner.</p>	The parameters are assessed to ensure the teaching methods of benchmarked standards are being used throughout the institute. Feedback is communicated to the concerned faculty member.	Each faculty member is encouraged to undergo at least one FDP per year. The FDP is mainly focussed to improve the communication skills and to train the faculty in improvised methods of techniques of analysis and to get exposure to new tools. The FDPs are carried out at the institute level itself by the learning and development team mainly sponsored under TEQIP-III.

Table B.7.2.3b

**(c) Academic Audit Report through External Experts**

In addition to the above exercise an academic audit by an expert committee from outside the institute was initiated from the year 2017 onwards. However in 2018, an audit was conducted through the following faculty members.

**Auditors Name:**

1. Dr. I. M. Mishra  
Professor, Department of Chemical Engg., N.I.T Jalandhar.
2. Dr. V. C. Srivastava  
Associate Professor, Department of Chemical Engg., I.I.T Roorkee

## Date of Audit: 21-04-218

<i>Proposed</i>	<i>Action</i>
<ul style="list-style-type: none"> <li>○ Purchasing of few sophisticated instruments like: GC, TGA, FTIR, GC-MS, HPLC, FE_SEM, X-RD, Ion chromatography, COD Analyser, TOC analyser, pore area distribution analyser.</li> </ul>	<ul style="list-style-type: none"> <li>❖ TGA (order placed)</li> <li>❖ COD Analyser purchased</li> <li>❖ GC-MS in pipeline under CRFC</li> <li>❖ DO/PH/Ion Meter purchased</li> <li>❖ CHNS Analyser purchased</li> <li>❖ FTIR purchased</li> <li>❖ HPLC purchased</li> </ul>
<ul style="list-style-type: none"> <li>○ The trend started by department faculty members of publishing research papers in reputed journals like Elsevier, ACS, Taylor-Francis should be encouraged amongst PhD and M. Tech students.</li> </ul>	<ul style="list-style-type: none"> <li>❖ The trend has been taken initiated as suggested and for details of published papers given in criteria 5.</li> </ul>
<ul style="list-style-type: none"> <li>○ The department should initiate interaction with industries present in J&amp;K as well as other parts of the country in form of lectures from industrial personnel, academia-industry interaction sessions/workshops.</li> </ul>	<ul style="list-style-type: none"> <li>❖ The department has initiated conducting workshop / STC's etc.</li> <li>❖ In last 3 years 3 STC's and 2 workshops were conducted Following are the details <ul style="list-style-type: none"> <li>✓ Coordinated a one day workshop on Process Safety on 8<sup>th</sup> of June 2017</li> <li>✓ Coordinated five day national level workshop on Environment title "Connecting people to nature-CPTN-17" from 25-29th Sep., 2017.</li> <li>✓ Coordinated five day workshop on Process Control from 13<sup>th</sup> to 17<sup>th</sup> of November 2017</li> <li>✓ Coordinated five days S.T.C on Transport Process in Jan-2018.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>○ Efforts should be made to Interact students with visiting faculties from eminent industries and academia.</li> </ul>	<ul style="list-style-type: none"> <li>❖ The suggestion has been widely implemented. Following are the details of visiting faculties and industry persons: <ul style="list-style-type: none"> <li>✓ Mr. Junaid Ashraf, IOCL</li> <li>✓ Dr. I.M. Mishra, IIT/ISM Dhanbad</li> <li>✓ Dr. V.C. Srivastava, IIT Roorkee</li> <li>✓ Dr. M.K. Jha, NIT Jalandhar</li> <li>✓ Dr. Jatindra Sangwai, IIT Madras</li> <li>✓ Mr. Parvaiz Qalander, Ex. GM JK Cements</li> </ul> </li> </ul>

<ul style="list-style-type: none"> <li>○ Computational facilities of the department should further be augmented with addition of high end computational facilities, cluster computing, servers, etc. A full high end computer lab with chemical engineering related softwares such as ANSYS, ASPEN PLUS, COMSOL, GEMS, MATLAB, MATHEMATICA, MAPPLE, STATISTICA etc should be established. Moreover both undergrad and post graduate students should be given projects that would acquaint them with these softwares, to increase there employability and motivate them to further research</li> </ul>	<ul style="list-style-type: none"> <li>❖ Purchase of software is in pipeline (Tendered)</li> </ul>
<ul style="list-style-type: none"> <li>○ Books in the central library regarding Chemical Engineering should be increased. Further, the students may be issued six textbooks for the entire semester, three references and research books for maximum 15 days. Digitisation of library may be done on priority basis and linked to the department computers.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Implemented as proposed/suggested.</li> </ul>
<ul style="list-style-type: none"> <li>○ Subscription to chemical engineering journals should be increased for benefit of research students and faculty.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Implemented as suggested</li> </ul>
<ul style="list-style-type: none"> <li>○ Effort should be made to submit a proposal to IChE (Indian Institute of Chemical Engineers)headquarters, Kolkata for opening a new Srinagar regional centre with its headquarters at NIT Srinagar.</li> </ul>	<ul style="list-style-type: none"> <li>❖ The chapter of IChE is already in place.</li> </ul>
<ul style="list-style-type: none"> <li>○ Renovation of all laboratories of the department may be initiated with floor tiling, False-ceiling and air conditioners, wherever necessary, on priority basis.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Done in most of the cases. <ul style="list-style-type: none"> <li>✓ Energy Engineering Lab.</li> <li>✓ Environmental Engg. Lab.</li> <li>✓ Others in pipeline</li> </ul> </li> </ul>

Table B.7.2.3c

**7.3 Improvement in Placement, Higher Studies and Entrepreneurship (10)****Claimed 9****➤ Improvement in Placement, Higher studies**

Academic Year	Number of students enrolled	Number of students placed	Number of students opted for higher studies	Percentage of placement and higher studies
2019-2020	34	6	5	32.35
2018-2019	60	13	6	31.66
2017-2018	64	12	8	31.25

**Table B. 7.3a**

Note: Although the number of students placed has decreased, but the number of students actually placed in core companies has increased subsequently. It is observed that placement data is slightly unpromising for CAY 2019-2020. This can be attributed to the unfortunate COVID-19 pandemic in Spring 2020, that negatively affected the placement drives as well as job market. However, this was compensated with a larger percentage of students opting for higher studies.

**➤ Higher Studies**

Academic Year/ Department	Student Strength	Number of students opted for Higher Studies
2019-2020	34	5
2018-2019	60	6
2017-2018	64	8

**Table B. 7.3b**

Note: Number of students admitted for higher studies has increased.

**7.4. Improvement in the quality of students admitted to the program (20)****Claimed 19**

Student quality is assessed through the opening and closing ranks in JEE Mains, of students admitted into the undergraduate program of Chemical engineering department.

*Opening and closing rank analysis:-*

Item	2020-2021	2019-2020	2018-2019	
<b>Joint Entrance Examination, main (JEE main)</b>	<b>No. of Students admitted</b>	92	73	69
	<b>Opening Rank(GN)</b>	OP-45334 OBC- 51084 SC- 148859 ST-220405 EWS-71366	OP-44391 OBC- 71170 SC-120962 ST-205065	OP-57290 OBC-52410 SC-173008 ST-197165
	<b>Closing Rank(GN)</b>	OP-417361 OBC-103297 SC- 508016 ST-513764 EWS-394653	OP- 167048 OBC- 575193 SC- 543611 ST- 440549	OP-728594 OBC-219696 SC-489361 ST-358480

**Table B. 7.4a**

Item	2020-2021	2019-2020	2018-2019
<b>No. of Students admitted</b>	92	73	69
<b>Average PCM Percentage</b>	76%	78%	88.13%

**Table B. 7.4b**