Innovations by the Faculty in Teaching and Learning

All faculty members use a variety of innovative practices in their teaching pedagogy. Some of the most innovative practises are highlighted below

Innovations in Teaching and Learning

Sr. No.	Details of Innovative Practice	Name of the Courses	Observed Benefits
1	**Course specific industry visits**	**Examples:** ● ***Course***- Renewable Energy Systems , ***Industry*** -Novasys Greenergy Pvt. Ltd Nagpur ● ***Course***- Manufacturing Processes, ***Industries***- , Nikhil Furniture, Kinetic Gear MIDC Nagpur ● ***Cours***e- Manufacturing Technology, ● ***Industries*** - Sharda Ispat Butibori., Neema forge, Hingna, Solar Explosives, Nagpur, Sandeep Metalcraft Private Limited MIDC Hingana	It allows students to learn about the latest developments in the field from eminent industry experts, and it also gives them an idea about the opportunities available in the industry, understanding job roles and work culture.
2	**Course Specific Guest lectures from industry experts**	**Examples:** ● ***Course***- Renewable Energy Systems ***Topics*** - Mono PERC Half cut PV modules , Recent developments in PV	It allows students to learn about the latest developments in the field from eminent industry experts, and it also

	Wherever possible, faculty members identify a suitable expert speaker from an outside organization to deliver a talk on recent developments in the topics related to their course.	manufacturing, Commercial PV systems ***Speaker***- Mr. Ashok Kumar Singh, Ms. Vidya, Mr. Pratik Joshi from Novasys Greenergy Pvt. Ltd Nagpur	gives them an idea about the opportunities available in the industry, understanding job roles and work culture.
3	**Co-teaching** **In a few courses, the faculty member identifies the expert from industry to modify the curriculum in accordance with the most recent needs ofthe industry. This practice is used to keep the students up to date with the industries. Throughout the session, the expert faculty engages a few classes and covers these topics.**	**Examples:** **Course-** IoT & Industry 4.0 **Faculty-** Mr Nilesh Sahare Director Blinc Innovations, Nagpur **Course-** Electric Vehicle Technology **Faculty-** Mr. Ashutosh kalinkar, Powertrain Systems Engineer, FCA Fiat Chrysler Automobiles, ***Detroit USA*** and Mr. Saurabh Bhasme, Control Algorithms Lead · Electra Vehicles, Inc. ***Boston USA***	It facilitates students in keeping updated with industry best practices. Students are made aware of the various opportunities and the skills needed by industries. It helps students to improve inter-disciplinary It facilitates better departmental connections with industry for potential consulting engagements and collaborative research projects.

4	**Students engagements in live consultancy assignment**	***Examples:*** ***Consultancy Project***:Development And 3-D Printing of Molds for Swanand GVAK Nagpur ***Name of students***: Harsh Sharma ***Consultancy Project***: Design and Development of Pouch sealing machine for Sensors and Systems. Nagpur ***Name of students***: Ram Bhute & Anas Zafar	It helps students in applying their theoretical classroom knowledge to real-world problems.
5	**Hands on session** **Wherever possible, most faculty members provide hands-on sessions to students to give them field exposure to the course content.**	● 3-D Printing on Utimkaer and 3-D scanning by Ein Scan ● OSAW Mechanism Models ● YASKAWA arc welding robot and MIPS system ● limit gauges and filler gauges ● CNC turning machine ● Assembly of ICE and Automobile components ● Components of gears trains ● 450 kW grid connected rooftop	It enables students to comprehend theoretical Knowledge as well as the practical utility of each component in real-life applications.

		Solar Plant, 32 sq. m CST system	
6	**Self-learning of students**	Students are actively involved in the Design, Analysis, fabrication and testing of an all-terrain vehicles under SAE club, different drones and robots under Robotic club activities.	It enables students to utilize their creativity and apply their technical skills by promoting self-learning. The students also learn various tools and methodologies used by the industry. They develop team working, managerial and inter-personal skills along with motivation for lifelong learning.

7	**Use of ICT in teaching** **All faculty members make use of various ICT tools such as powerpoint presentation, animations, videos, visuals, models, simulation tools etc while teaching their courses.**	All faculty members in all courses , especially the courses like manufacturing processes (Process animations and videos, working of different machines), Kinematics of Machines, Automobile Engineering (Animations of various mechanisms and auto components) etc.	It has improved students involvement in teaching learning process. Animations and videos help them for better understanding a few concepts Improved curiosity to gain more subject knowledge
8	**Use of students' own smartphones** **Students were allowed to use their own smartphones during a few classes for learning a few concepts during class, searching recent updates, conducting polls, open resource quizzes etc.**	Renewable Energy Systems, Heat Transfer, Non-conventional Energy Sources	It has improved students involvement and permission to use mobile phones make them relax to learn more in subsequent classes
9	**Live streaming of news videos**	Renewable Energy Systems	It enables in keeping students' interest high during learning

	To make the students aware of the latest happening in the area of course, a few faculty members uses live streaming of some recent news related to the course content such as COP conference footage, prime minister's speeches on technology development, news on climate change and global warming, BBC reports etc		by correlating their curriculum with current events in the world

10	**Video lectures** **Few faculty members use their own recorded videos, which are shared with students so that they can re-watch them as needed to clear their doubts about a few complicated topics.** **Some faculty members make use of selected NPTEL courses and video lectures by eminent international faculty members in their courses while teaching.**	Productivity Improvement Techniques Supply Chain Management Finite Element Methods Design Of Machine Elements Machine Drawing Manufacturing Process Instrumentation and Control Fluid Mechanics Heat Transfer Renewable Energy Systems	It allows students to refer to high-quality reference material after class at their leisure, allowing them to gain a thorough understanding of the concepts.
11	**Presentations on Research Papers**	Productivity Improvement Techniques, Supply Chain Management	It builds confidence and improves the mass communication skills. Helps student to understand how and where to search literature, and its

			classification and organization. It teaches the students about research ethics and plagiarism.
12	**Innovative Assessment Techniques** **(formative assessment)**	● ***Online MCQ based quizzes*** - All courses ● ***Presentations*** (Seminars on the selected topics) - Stress Analysis, IOT, Manufacturing Process, Automobile Engineering ● ***Research paper Review*** - Productivity Improvement Techniques ● ***Model Making*** - IOT, Additive Manufacturing, Machine Design ● ***Video Making*** - Renewable Energy Systems, Heat Transfer, FEM ● ***Essay Writing*** - Renewable Energy Systems, Heat Transfer	These multiple methods of assessment, helps students in maintaining their interest in learning the course effectively. It also assists them in developing interpersonal and extracurricular skills such as presentation, peer communication, teamwork, and confidence.
13	**Real Life case studies / Problem Solving**	***Assignments based on live problems*** : 1. Design of Solar Water heaters and PV systems for their own residence. 2. Design and selection of Electric powertrain,	It enables students to comprehend theoretical knowledge as well as the practical utility of each component

		motor sizing, battery, BMS and charging type for individual Electric vehicles for a selected purpose and application. ***Example:*** Student of VII sem, Ms. Sania Singhania got an internship offer at ***Brane Enterprises Hyderabad*** based on her course assignment of Electric Vehicle Technology.	in real-life applications. This helps them during job interviews
14	**Group/ Peer Learning**	Wherever possible, groups of PhD, PG and UG students are formed. All these students are working together on a specific problem under the supervision of a single supervisor.	People with different skills and abilities are working together, which allows them to exchange knowledge among themselves. It motivates revisiting individual learning benchmarks inspired by observing peers. Undergraduate students learn a lot from their seniors. Working together on the same problem adds new dimensions to research, which improves the quality of research and brings awareness among undergraduate students about how master's and PhD

			research can benefit them.
15	**Technical Events and Conferences**	For students, a bi-annual national technical event called Vortechx is being organized, which features many competitions and workshops. Students from the college and other colleges participate actively. The department regularly organizes the international conference on cutting-edge fields where students actively participate to present their papers and listen to guest speaker.	Students gain confidence, soft skill enhancement, managerial and leadership skills through organization and execution of these activities and events. Multiple benefits were observed some of the prominent are listed as ● Leadership Skills ● Communication Skills ● Organizational Skills ● Ethics ● Team Work ● Knowledge Updates ● Networking opportunity with diversified world