Course Type	CourseCode	Nameof the Course	L	T	P	Credits
DP	NMEC527	**CAM and Mechatronics Lab**	0	0	3	1.5

CourseObjective
The objective of this course is to train the students on CNC machining, motion control, and introduction to the advanced processes supported by the NC system. Hands-on training on the development of such machines on a table-top scale. Concept of a mini-factory. Advance learning of multi-axis motion control and synchronization between them.
LearningOutcomes
In the end, students will be able to handle a CNC machine with various controllers. They will be able to design and develop simple CNC controlled equipment, including machining, positioning, and moving type equipment with PLCs and sensors.

Unit No.	Topicsto beCovered	Lecture Hours	LearningOutcome
1	Training of CNC milling and turning	3	Part programming, simulation and machining on turning and milling on Flexturn and Flexmill
2	Profile cutting on unconventional machines	3	CAD design and profiling on different materials and different shapes. Studying the speed of work on different unconventional machining
3	Training and generation of G-codes of simple to complex shapes	3	Master CAM training, code generation for different controllers
4	3D Profiling and machining on VMC	3	Get familiarized with machining on VMC
5	Learning of disassembly and assembly of CNC VMC and CNV VMC with fourth axis	3	Learning basics of the disassembly and assembly of a CNC machinecenter. Connections between stages, stepper motors, controllers, and power supply integration with the computer.
6	Generation of microfeatures on high-precision micromachining center	3	Understanding the difference between a conventional CNC machine and a high precision machining center.
7	Learning and study of pneumatic and electrical based actuators	3	Study of actuator-based motion and its control
8	Controlling a stepper/servo motor with a PLC	3	Develop basic understanding of motion control
9	Use of sensors for motion control	3	Develop basic understanding of sensors and its role in motion control
10	Project	15	Utilizing the knowledge gained during the course to execute some real task based project
	TOTAL	42	

Text Books:

1. CAD/CAM: Computer-Aided Design and Manufacturing, MP Groover and EW Zimmers,Pearson Education
2. Mechatronics. W. Bolton, Pearson publishers, 4th Edition.

Reference Books:

1. Computer Aided Manufacturing, PN Rao, NK Tewari and TK KundraMcGraw Hilleducation