

M.Tech. in Mechatronics

Preamble:

In today's world, boundaries between different disciplines have become indistinct. In last two decades multidisciplinary approach has grown. For example, a car steering or fuel injection system, initially a pure mechanical system, has been replaced by a combination of mechanical, electronic and control systems.

PDPM IITDM Jabalpur, from the very beginning gave emphasis on multidisciplinary approach. Hence a course on mechatronics is part of compulsory curriculum. Mechatronics is a field of engineering which deals with the integration of Mechanics and Electronics with intensive computer integration using a multidisciplinary approach to product and manufacturing system design. It is a design philosophy which encourages engineers to integrate precision mechanical engineering, digital and analog electronics, control theory and computer engineering in the design of "intelligent" products, systems and processes rather than engineering each set or requirements separately.

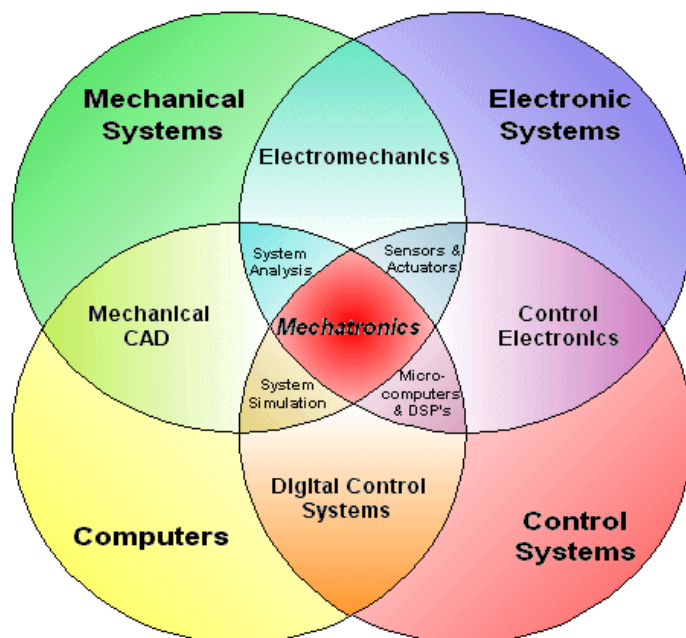


Figure: Mechatronics: An Integrated Approach

Introducing Mechatronics in the engineering curriculum supports the synergistic integration of precision mechanical engineering, electronics and control systems into the design, the commissioning, the operation, the maintenance and the repair of "intelligent" products and processes. The advantages of the Mechatronics approach to

design are shorter design cycles, lower costs, and elegant solutions to design problems that cannot easily be solved by staying within the bounds of the traditional engineering disciplines.

Motivation

Industrial needs

With the increase in automated production and computerized manufacturing in industries, requirements for multi-disciplinary engineers with in-depth knowledge of mechanics, electronics, and computers have increased. Further more, the increasing development of automatic production, use of microelectro-mechanical-systems (MEMS), intelligent sensors, and advancement in automotive technology accelerated the growth of mechatronics.

Educational motivation

In the last few decades, students are encouraged to study the system rather than a few components of the system. A system requires knowledge of interaction among different engineering fields. This enhanced the need for a curriculum that offers integrated system engineering and Mechatronics is one such possible alternative.

Objectives

Proposed M.Tech. in Mechatronics provides an opportunity for engineering students to develop a project oriented, hands-on training experience in a multidisciplinary environment. This will offer them a chance to integrate electrical/ lectronic, digital and mechanical systems into Mechatronic systems. Therefore, the long-term goal of this programme is to enhance interdisciplinary learning towards design of products and services. It will cater to the need of today's automated industry environment as well as design and maintenance of the automated services which has now become so common in use.

Eligibility for Admission

Candidates with a Bachelor's Degree in Mechanical Engineering, Electrical and Electronics engineering, Electronics and Communication Engineering, Automobile Engineering, Production Engineering, Computer Science and Engineering are eligible for this M.Tech. programme.

Curriculum

Semester I	
Course Title	Credits
Professional and Communication Skills	1-0-2-2
Analytical Methods in Engineering	3-0-0-4
Concepts in Mechanical Systems (for ECE and CSE students) Or Concepts in Electronic Devices (for Mechanical Students)	3-0-2-4
Sensors and Actuators	3-0-2-4
Systems and Control	3-0-2-4
Semester II	
Course Title	Credits
Elective I	3-0-0-4
Elective II	3-0-0-4
Elective III	3-0-0-4
Graduate Seminar I	0-0-3-2
Mini Project	0-0-6-4
Semester III	
Course Title	Credits
Graduate Seminar II	0-0-3-2
M.Tech. Dissertation	12
Semester IV	
Course Title	Credits
M.Tech. Dissertation	18

Electives (3-0-0-4)	
Microcontroller, PLC and Applications	Power Electronics and Drives
Fluid Power Systems and Factory Automation	Principles of Signal and Image Processing
Autotronics	Computer Integrated Manufacturing
Robot Dynamics and Analysis	Mechatronic System Dynamics & Design
Machine Vision System	Simulation of Structure, field and flow
Finite Element Analysis	Machine Tool Control and Condition Monitoring
Fuzzy logic and Neural Networks	Medical Electronics and Instrumentation
Computational Fluid Dynamics	Smart Materials and Structures
Micro Electromechanical Systems (MEMS)	Advanced Control systems
Electro optic Systems	Vibration and Noise Engineering
Embedded Sensors and System Design	