



National Institute of Technology Meghalaya

An Institute of National Importance

CURRICULUM

Programme	Bachelor of Technology in Mechanical Engineering	Year of Regulation	2018
Department	Mechanical Engineering	Semester	VII

Course Code	Course Name	Credit Structure				Marks Distribution				
		L	T	P	C	INT	MID	END	Total	
ME 419	MECHATRONICS AND CONTROL	3	0	0	3	50	50	100	200	
Course Objectives	To provide knowledge hydraulic, pneumatics and electrical actuators.	Course Outcomes	CO1	Able to illustrate the mechatronics system and its components construction, application.						
	To provide knowledge various sensors.		CO2	Able to analysis sensor application, construction operation.						
	To provide knowledge about controller, micro controller and data acquisition system		CO3	Able to describe actuator system components like, hydraulic, pneumatic, electrical actuating system.						
			CO4	Able to design hydraulic, pneumatic and electric circuit for mechatronic system.						
			CO5	Able to design controller for mechatronics system.						
			CO6	Able to apply data acquisition system and microcontroller system and control.						

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3	0	0	0	0	0	0	0	0	0	0	0	2	2	0
2	CO2	3	2	0	0	0	0	0	0	0	0	0	0	2	2	0
3	CO3	3	3	0	0	0	0	0	0	0	0	0	0	2	2	0
4	CO4	3	3	3	0	0	0	0	0	0	0	0	0	3	3	0
5	CO5	3	3	3	0	0	0	0	0	0	0	0	0	3	3	0
6	CO6	2	3	3	0	0	0	0	0	0	0	0	0	3	3	0

SYLLABUS

No.	Content	Hours	Cos
I	Key element of the Mechatronics system, examples of the Mechatronics system.	2	CO1
II	Sensor and Transducer: characteristic of sensor, displacement sensor, proximity sensor, velocity sensor, pressure sensor, force sensor, temperature sensor, light sensor	5	CO1 CO2
III	Hydraulic system: hydraulic pump, control valve, actuators and motors, hydraulic circuit design.	8	CO1 CO3 CO4
IV	Pneumatic system: compressor, air treatment and pressure regulation, actuators, application of pneumatic system	4	CO1 CO3 CO4
V	Electrical system: DC motor, AC motor, Stepper Motor	3	CO1 CO3 CO4
VI	Control theory: Close loop and open loop control, transfer function representation, state space representation, Routh stability criteria, Nyquist stability analysis, PID controller and its tuning.	8	CO5
VII	Micro processor and Microcontroller, programming in microcontroller.	3	CO6
VIII	Data acquisition system: Analogue to digital conversion, digital to analogue conversion, USB communication, network connection.	3	CO6
Total Lab Hours		36	

Essential Readings

1. M. Jouaneh, Fundamental of Mechatronics, Cengage Learning, 1st edition, 2015.
2. W. Bolton, Mechatronics: Electronic Control Systems In Mechanical And Electrical Engineering, Pearson, 2015
3. K. Ogata, Modern Control Engineering, fifth edition, Prentice Hall, 2010.

Supplementary Readings

1. A. Esposito, "Fluid Power with Applications", Pearson Education, 2003
2. M. G.Rabie, "Fluid Power Engineering", McGraw Hill, 2009