Indian Institute of Information Technology Bhagalpur Mechatronics Engineering (MEA)

B.Tech. Curricula and Syllabus

Semester-VI

Curricula:

Course	Course name	L	Т	Ρ	С
Code					
<u>ME303</u>	Mechatronics and Automation	3	0	0	3
<u>CS307</u>	Machine Learning	3	0	0	3
<u>ME306</u>	Environmental Sciences & Green Technology	2	0	0	2
	Elective-I	3	1	0	4
	Elective-II	3	1	0	4
ME311	Mechatronics LAB	0	0	З	2
ME312	Sensors and Control LAB	0	0	3	2
CS314	Machine Learning LAB	0	0	3	2

Syllabus:

Course Code	Course name	L	Т	Р	С	Year	Semester	
ME303	Mechatronics and Automation	3	0	0	3	3 rd	6 th	
Course objective: To introduce the need, evolution, and motivation for Industrial Automation. Familiarization with basic concepts and different automation strategies being used in practice worldwide.								
Contents						No. of Lectures		
Module : 1								
Introduction to design of mechatronics system: What is mechatronics – the						7		
design process, Systems, Measurement systems, Control systems, Programmable								
logic controller, Example of mechatronic systems.								
Module : 2								

Basic system m blocks, Electrical system building b	8			
Module : 3				
Mechatronic system – Perform	8			
Module : 4				
Programmable I Architecture and s modules, CPU & Converting simpl Simple instruction switches - Latchin Module : 5 Applications of Retentive timers, instructions, mathematical Simple metorial	8			
Simple materials Automatic lubrica Bottle label detec				
	Total	42		
Text	 Gary Dunning, "Introduction to Programmable Logic Controllers", 3rd India edition, Cengage Learning, 2007 John Webb, "Programmable Logic Controllers: Principles and Applications", 5th edition Prentice Hall of India, 2012. 			
Reference	:e 1. W. Bolton, "Mechatronics: electronic control systems in mechanical and electrical engineering", Longman, Singapore, 1999			

Course Code	Course Name	L	Т	Ρ	С	Year	Semester	
CS307	Machine Learning	3	0	0	3	3 rd	6 th	
Course Objective:	Machine learning is the science of get	tting	com	pute	ers to	act without b	eing explicitly	
programmed. Ma	chine learning is so pervasive today th	at yo	ou pr	oba	bly u	se it dozens o	f times a day	
without knowing	it. This course will help the students to	o lea	rn th	e ne	cessa	ary details to o	create next	
generation applic	ations.							
Торіс							Hour	
Module I	Introduction: History of machine lea	rning	g, Bas	sic co	once	pts	3	
	Supervised learning: Supervised lear	ning	setu	p, Ll	ИS, L	ogistic		
	regression, Perceptron, Exponential	fami	ly, G	ener	ative	elearning		
Module II	algorithms, Gaussian discriminant ar	nalys	is, Na	aive	Baye	s, Support	10	
	vector machines, Model selection ar	nd fe	ature	e sel	ectio	n, Ensemble		
	methods: Bagging, boosting.							
	Learning theory: Bias/variance trade	-off,	Unic	on ar	nd			
Module III	Chernoff/Hoeffding bounds, VC dime	ensic	on, W	/orst	case	e (online)	7	
	learning.							
	Unsupervised learning: Clustering K-	mea	ns, E	M. N	/lixtu	re of		
Module IV	Gaussians, Factor analysis, PCA (Prin	cipa	l com	npon	ents	analysis),	8	
	ICA (Independent components analy	vsis).						
	Reinforcement learning and control: MDPs. Bellman equations,							
Module V	Value iteration and policy iteration, Linear quadratic regulation						7	
	(LQR), Q-learning. Value function ap							
						Total	35	
	1. Ethem Alpaydin, Introduction to Machine Learning, Second Edition, PHI,							
Toxt	2010.							
I CAL	2. Marsland, Stephen. Machine learning: an algorithmic perspective. Chapman							
	and Hall/CRC, 2011.							
	1. Murphy, Kevin P. "Machine Learning: A Probabilistic Perspective (Adaptive							
	Computation and Machine Learning series)." (2018), MIT Press.							
Reference	2. Brownlee, Jason. Machine Learning Mastery With Python: Understand Your							
	Data, Create Accurate Models and Work Projects End-To-End. Jason Brownlee,							
	2016.							

Course Code	Course name	L	Т	Р	С	Year	Semester	
ME306	Environmental Sciences & Green <u>Technology</u>	2	0	0	2	3 rd	6 th	
Course objective: To bring in the importance and the underlying principles of great						en and sustainable		
technology.	technology.							
Topic	Contents						No. of Lectures	
<u>Module-I</u>	Introduction to Environmental Pollution: Environmental Awareness, Concept of an ecosystem, structure and function of an ecosystem, energy and nutrient flow, biogeochemical cycles, sources, pathways and fate of environmental pollutants.					05		

Module-II	Air pollution- Introduction, Segments of environment, Layers of atmosphere and their significance; Mechanism, Causative factors, Consequences and Preventive measures – Ozone depletion, Greenhouse effect and Global warming; Earth's radiation budget, Classification of air pollutants, Indoor air pollution, Smog- photochemical and sulphurous, Acid rain, Air Quality Standards, Human health effects-Bhopal gas tragedy.	05
<u>Module-III</u>	Water Resource; Water Pollution : Definition, Classification , Sources of Contamination, Pollutants & their Detrimental Effects; Water Quality: Portability limit – WHO and PHED Specification; Water Quality Monitoring, Municipal Water Treatment: Slow and Rapid Sand Filter, Disinfection – Methods, Advantages & Disadvantages, Sterilization	05
<u>Module-IV</u>	Soil and Noise pollution: Lithosphere and Soil profile, Soil contamination, sources of soil contamination, Important environmental properties of soil contaminants, Ecological & Health effects, Exposure & Risk Assessment; Noise pollution: Brief introduction to noise pollution, source, measurement and prevention of noise pollution	05
Module-V	Radioactive Pollution & Solid Waste Management: Radioactive pollutant: units of radiation and instruments for their measurements, types of radioactive pollutants and risk factor associated with these radiations Radioactive waste and their disposal, accidental leakage of radiation from nuclear reactors (discuss Chernobyl and Fukushima) Solid waste management different types of solid waste, composting, biological methods of detoxification of hazardous waste Onsite handling and composting, integrated solid waste management,	05
	Total	42
Text	 Miller, T. G. Jr., <i>Environmental Science</i>, Wadsworth Publishing House, Masters, G.M, <i>Introduction to Environmental Engineering</i>. 	USA.