Indian Institute of Information Technology Bhagalpur

Mechatronics Engineering (MEA)

B.Tech. Curricula and Syllabus

Semester-VII

Curricula:

Course Code	Course name	L	T	P	C
HS401	**Professional Ethics for Engineers**	**2**	**0**	**0**	**2**
ME401	Robotics	3	0	0	3
	Elective – III	**3**	**1**	**0**	**4**
	Open Elective	**3**	**1**	**0**	**4**
HS45X	**Foreign Language**	**0**	**0**	**2**	**2**
ME411	**Robotics Lab**	**0**	**0**	**3**	**2**
CS491	**Minor Project**	**0**	**0**	**6**	**4**
SAI-S-III	**Industry Internship**	**0**	**0**	**0**	**2**

Syllabus:

Course Code	Course name	L	T	P	C	Year	Semester
HS401	Professional Ethics in Engineers	2	0	0	2	4th	7th
Course objective: To enable the students to create an awareness on Engineering Ethics and Human Values, to instil Moral and Social Values and Loyalty and to appreciate the rights of others.							
Topic	Contents						No. of Lectures
Module-I	HUMAN VALUES: Morals, Values and Ethics, Integrity, Work ethic, Service learning, Civic virtue, Respect for others, Living peacefully, Caring, Sharing, Honesty, Courage, Valuing time, Cooperation, Commitment, Empathy, Self-confidence, Character- Spirituality, Introduction to Yoga and meditation for professional excellence and Stress management.						05
Module-II	ENGINEERING ETHICS: Senses of Engineering ethics, Variety of moral issues, types of inquiry- Moral dilemmas, Moral Autonomy, Kohlberg's theory, Gilligan's theory, Consensus and Controversy, Models of professional roles, Theories of right action, Self-interest, Customs and Religion, Uses of Ethical theories.						05
Module-III	ENGINEERING AS SOCIAL EXPERIMENTATION: Engineering as Experimentation, Engineers as responsible experimenters, Code of ethics, A Balanced Outlook on Law						04
Module-IV	SAFETY, RERSPONSIBILITIES AND ETHICS: Safety and Risk, Assessment of Safety and risk, Risk Benefit Analysis and Reducing Risk, Respect for authority, Collective Bargaining, Confidentiality,						05

	Conflict of interest, Occupational crime, Professional Rights, Employee Rights, Intellectual Property Rights (IPR), Discrimination	
Module-V	GLOBAL ISSUES: Multinational Corporations, Environmental Ethics, Computer ethics, Weapons Development, Engineers as managers, Consulting engineers, Engineers as Expert Witnesses and Advisors, Moral Leadership, Code of conduct, Corporate Social Responsibility	05
	Total	24
Text	1. Mike W Martin and Roland Schinzinger, *Ethics in Engineering*, Tata McGraw Hill, 2003. 2. Govindarajan M, Natarajan S, Senthil Kumar V S, *Engineering Ethics*, Prentice Hall of India, 2004.	

Course Code	Course name	L	T	P	C	Year	Semester
ME401	Robotics	3	0	0	3	4^{th}	7^{th}

Course objective:

1. To introduce the functional elements of Robotics.
2. To impart knowledge on the direct and inverse kinematics.
3. To introduce the manipulator differential motion and control.
4. To educate on various path planning techniques.
5. To introduce the dynamics and control of manipulators.

Contents		No. of Lectures
Module 1		
Introduction	Mathematical Modeling of Robots, Robots as Mechanical Devices, Common Kinematic Arrangements of Manipulators, Rigid Motions And Homogeneous Transformations	9
Module 2		
Kinematics	Kinematic Chains, Forward Kinematics: The Denavit-Hartenberg, Convention, Inverse Kinematics, Angular Velocity: The Fixed Axis Case, Skew Symmetric Matrices, Angular Velocity: The General Case, Addition of Angular Velocities, Linear Velocity of a Point Attached to a MovingFrame, Derivation of the Jacobian, Singularities	9
Module 3		
Dynamics of Robot Manipulators	The Euler-Lagrange Equations, General Expressions for Kinetic and PotentialEnergy, Equations of Motion, Some Common Configurations, Properties of Robot Dynamic Equations, Newton-Euler Formulation	9
Module 4		
Control of Robot Manipulator	PD control, Nonlinear Control, Stability, Lyapunov's Direct Method, Adaptive Control	12

Module 5		
Path-Planning	Configuration space, potential fields	5
	Total	44