Maulana Abul Kalam Azad University of Technology, West Bengal

(Formerly West Bengal University of Technology)

SYLLABUS FOR BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING

(Effective from academic session 2018-19)

Subject Code: G	**Category:** Professional Elective Courses
Subject Name: Mechatronics	**Semester**: Sixth
L-T-P: **3-0-0**	**Credit: 3**
Pre-Requisites: Fluid Mechanics and Fluid Machinery, Kinematics and Theory of Machines, Basic Electrical Engineering, Basic Electronics Engineering	

Course Objectives:

To provide knowledge on electrical circuits, signal conditioning.
To make familiar about control system and power electronics in designing mechatronic system

Course Contents:

Module No.	Description of Topic	Contact Hrs.
1	Introduction to Mechatronics: Definition, Mechatronics in design and manufacturing, Comparison between Traditional and Mechatronic approach; Concurrent engineering	3
2	Review of fundamentals of electronics: Logic gates and their operations, Signal processing devices, Data conversion devices, Input and output devices. Sensors and Transducers, Actuators, Limit switches, Relays	6
3	Control Systems: Open loop and closed loop control, block diagrams, transfer functions, Laplace transforms.	3
5	Electrical Drives: Stepper motors, servo drives.	2
6	Mechanical Drives: Different mechanisms, Ball screws, Linear motion bearings, Transfer systems.	3
7	Pneumatic and Hydraulic Drives: Elements of pneumatic and hydraulic drives, comparison between them. Design of pneumatic and hydraulic circuits, symbolic representations of such circuits indicating different valves, actuators, etc.	4
8	Basics of 8085 microprocessor, programmable register architecture, buses, memory mapping, clock pulse and data transfer operations, and simple assembly and mnemonic programming on 8085 microprocessor.	5
9	Use of On-Off, PI and PID controllers to control different drives, Programming in PLC controller using Ladder diagram.	4
10	Mathematical modeling of physical systems, such as spring-mass vibration system, linear and rotory motion and its Laplace Transform.	2
11	Basics of time domain analysis, Introduction to discrete-time systems and Z-transform.	2
12	Introduction to Mechatronic systems, such as automatic brake, door closing and opening, robot, CNC machine, AGV, etc.	2

Course Outcomes:

At the end of the course, the student will be able to

1. Model and analyze mechatronic systems for an engineering application
2. Identify sensors, transducers and actuators to monitor and control the behavior of process or product.
3. Develop PLC programs for an engineering application.
4. Evaluate the performance of mechatronic systems.

Books:

1. W. Bolton, Mechatronics, 5th Edition, Addison Wesley Longman Ltd., 2010.
2. D. Shetty and R. Kolk, Mechatronics System Design, 3rd Edition, PWS Publishing, 2009.
3. D.G. Alciatore & M.B. Histand, Introduction to Mechatronics and Measurement systems, 4th Edition, McGraw Hill, 2006.
4. A. Smaili and F. Arnold, Applied Mechatronics, Oxford University Press, Indian Edition, 2007.
5. M.D. Singh and J.G. Joshi, Mechatronics, Prentice Hall of India, 2006.
6. K.K. Appu Kuttan, Introduction to Mechatronics, Oxford University Press, New Delhi, 2007.
7. HMT Ltd., Mechatronics, McGraw Hill Publication, 2017.
8. F.H. Raven, Automatic Control Engineering, McGraw Hill India, 2013.
9. K. Ogata, Modern Control Engineering, Prentice Hall, 2010.
10. B.C. Kuo, Automatic Control Systems, Prentice Hall, 1975.
11. A. Ambikapthy, Control Systems, Khanna Publishing House, 2015.