IV Year II Semester	L	T	P	To	C
	4	-	-	4	4

MT 426 DESIGN OF A MECHATRONICS SYSTEM (ELECTIVE - V)

Course Description & Objectives:

This course exposes students to robot anatomy, design & synthesis of manipulator mechanisms, end-effectors, trajectory planning and machine vision.

Course Outcomes:

On successful completion of this module the learner will be able to:

1. *summarize how mechatronics integrates knowledge from different disciplines in order to realise engineering and consumer products that are useful in everyday life.*
2. *design static and dynamic boolean logic systems using combinational, synchronous and asynchronous sequential logic.*
3. *outline the operation of the fundamental elements of microprocessor systems.*
4. *select appropriate transducer signal conditioning and devices for data conversion including operational amplifiers for analogue signal processing.*
5. *implement a continuous-time control design using software on a microprocessor for the manipulation, transmission, and recording of data.*
6. *select suitable actuators and sensors and integrate them with embedded control computers.*

UNIT I: Introduction:

Introduction to Mechatronics system, Key elements, Mechatronics Design process, Types of Design, Traditional and Mechatronics designs, Advanced approaches in Mechatronics, Man- machine interface, industrial design and ergonomics, safety.

UNIT II: Signals:

Real-time interfacing, Introduction, Elements of data acquisition and control, Overview of I/O processes, Analog signals, discrete signals, and Frequency signals

UNIT III: Mechanical Applications:

Case studies on Data Acquisition, Cantilever Beam Force Measurement system, testing of Transportation bridge surface materials, transducer calibration system for Automotive applications, Strain gauge weighing system, Solenoid Force-Displacement calibration system, rotary optical encoder, Controlling temperature of a hot/cold reservoir, pick and place robot.

UNIT IV: Thermal And Electronic Applications:

Case studies on control, Thermal cycle fatigue of a ceramic plate, pH control system, Dc-Icing Temperature Control system, Skip control of a CD Player, Autofocus Camera, exposure control, Case studies of design of mechatronic products, Motion control using D.C.Motor & Solenoids, Car engine management systems.

UNIT V: Advaced Applicatons:

Advanced applications in Mechatronics, Sensors for condition Monitoring, Mechatronic Control in Automated Manufacturing, Artificial intelligence in Mechatronics, Fuzzy Logic Applications in Mechatronics, Micro-sensors in Mechatronis.

TEXT BOOKS:

1. Devdas shetty, Richard A. Kolk, “Mechatronics System Design”, Thomson Learning Publishing Company, Vikas publishing house, 2001. Groover M P, “Industrial Robotics”, Pearson Publications.

REFERENCES:

1. Bolton, “Mechatronics - Electronic Control systems in Mechanical and Electrical Engineering”, 2nd ed., Addison Wesley Longman Ltd., 1999.
2. Brian Morriss, “Automated Manufacturing Systems - Actuators, Controls,Sensors and Robotics”, Mc Graw Hill International, 1995.
3. Bradley, D.Dawson, N.C. Burd and A.J. Loader, “Mechatronics: Electronics in Products and Processes”, Chapman and Hall, London, 1991. Fu K S, “Robotics”, McGraw Hill Publications

IV Year II Semester	L	T	P	To	C
	4	-	-	4	4

MT 428 DIGITAL IMAGE PROCESSING (ELECTIVE - V)

Course Description & Objectives:

This course exposes students to digital image fundamentals, image processing techniques, image compression and segmentation techniques.

Course Outcomes:

Upon successful completion of this course, students would be able to:

1. *discuss digital image fundamentals.*
2. *apply image enhancement and restoration techniques.*
3. *use image compression and segmentation techniques.*
4. represent features of images.