Course code	Course Name	L-T-P - Credits	Year of Introduction
MR482	Mechatronics	3-0-0-3	2016

Prerequisite : NIL

Course Objectives

- To provide basic knowledge on principles and design of Mechatronics systems.

Syllabus

Introduction to Mechatronics – Sensors and transducers – Open loop and closed loop control systems - continuous and discrete processes - servo mechanism – principles - components - error detectors - potentiometers- types-Design of modern CNC machines and Mechatronic elements - Machine structure - guide ways – drives – bearings - Measuring system for NC machines - Closed loop controllers - Mechatronics in Robotics - Man-machine interface. Fundamentals of ANN – Stages in designing mechatronic systems - case studies of mechatronics.

Expected outcome .

- The student will acquire basic knowledge on design, and application of Mechatronics systems

Text Book:

W. Bolton, *Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering*, Addison Wesley Longman Limited.

References:

1. R. C. Dorf, R. H. Bishop, *Modern Control Systems*, Addison Wesley
2. Krishna Kant, *Computer Based Industrial Control*, Prentice Hall of Indian Private Limited
3. HMT Limited, *Mechatronics*, Tata McGraw Hill Publishing Company Limited
4. Herbert Taub, Donald Schilling, *Digital Integrated Electronics*, McGraw Hill International Editions
5. Dan Necsulescu, *Mechatronics*, Pearson Education Asia, 2002(Indian reprint).

Course Plan

Module	Contents	Hours	Sem. Exam Marks
I	Introduction to Mechatronics – scope - Mechatronics and Engineering Design. Sensors and transducers – classification- thermal- electrical- optical- acoustic- pneumatic- magnetic- and piezo electric sensors- Smart sensors.	7	15%
II	Open loop and closed loop control systems - continuous and discrete processes - servo mechanism – principles - components - error detectors - potentiometers- types.	7	15%
FIRST INTERNAL EXAMINATION			

III	Design of modern CNC machines and Mechatronic elements - Machine structure - guide ways – drives – bearings - anti friction bearings- hydrostatic bearing- hydrodynamic bearing. Measuring system for NC machines - direct and indirect measuring system.	7	15%
IV	Closed loop controllers - proportional- derivative and integral controls - PID controller – digital controllers - controller tuning - adaptive control of machine tools. programmable logic controllers- architecture.	7	15%
SECOND INTERNAL EXAMINATION			
V	Mechatronics in Robotics - robot position and proximity sensing - tactile sensing. Man-machine interface. Fundamentals of ANN – perceptions – back propagation.	7	20%
VI	Stages in designing mechatronic systems - traditional and mechatronic design -possible design solutions - case studies of mechatronic systems - pick and place robot - automatic car park system – engine management system.	7	20%
END SEMESTER EXAM			

QUESTION PAPER PATTERN

Maximum Marks : 100 Exam Duration:3 hours

PART A: FIVE MARK QUESTIONS

8 compulsory questions –1 question each from first four modules and 2 questions each from last two modules (8 x 5= 40 marks)

PART B: 10 MARK QUESTIONS

5 questions uniformly covering the first four modules. Each question can have maximum of three sub questions, if needed. Student has to answer any 3 questions (3 x10 = 30 marks)

PART C: 15 MARK QUESTIONS

4 questions uniformly covering the last two modules. Each question can have maximum of four sub questions, if needed. Student has to answer any two questions

(2 x15 = 30 marks)