B.E. (Mechatronics) 2017 – Course Scheme
(1st_4thYear)

SEMESTER – I
(GROUP-A)

SR. NO.	COURSE NO.	TITLE
1.	UPH004	APPLIED PHYSICS
2.	UTA007	COMPUTER PROGRAMMING - I
3.	UEC001	ELECTRONIC ENGINEERING
4.	UTA015	ENGINEERING DRAWING
5.	UHU003	PROFESSIONAL COMMUNICATION
6.	UMA003	MATHEMATICS-I
7.	UCB008	APPLIED CHEMISTRY
8.	UTA009	COMPUTER PROGRAMMING-II
9.	UEE001	ELECTRICAL ENGINEERING
10.	UEN002	ENERGY AND ENVIRONMENT
11.	UTA013	ENGINEERING DESIGN
12.	UMA004	MATHEMATICS-II
13.	UES009	MECHANICS ^
14.	UTA014	ENGINEERING DESIGN
15.	UTA002	MANUFACTURING PROCESSES
16.	UMA031	OPTIMIZATION TECHNIQUES
17.	UES010	SOLIDS AND STRUCTURES *
18.	UES011	THERMO-FLUIDS *
19.	UME306	MECHANICS OF MACHINES
20.	UES012	ENGINEERING MATERIALS
21.	UMA007	NUMERICAL ANALYSIS
22.		COMPUTER AIDED DESIGN &
23.	UME409	ANALYSIS (WITH PROJECT)(INCL. 7
24.		SELF EFFORT HOURS)
25.	UME408	MACHINE DESIGN-I
26.	UME515	INDUSTRIAL ENGINEERING
27.	UEC404	SIGNALS AND SYSTEMS
28.	UME513	DYNAMICS AND VIBRATION
29.	UEC502	DIGITAL SIGNAL PROCESSING
30.	UEI501	CONTROL SYSTEMS
31.	UME501	APPLIED THERMODYNAMICS

32.	UEC507	MICROPROCESSORS AND MICROCONTROLLERS
33.	UTA012	INNOVATION AND ENTREPRENEURSHIP (5 Self effort
34.	UMT695	PROJECT SEMESTER*
35.	UMT696	GROUP PROJECT
36.	UME847	RAPID PROTOTYPING
37.	UME836	OPERATIONS MANAGEMENT
38.	UEE401	ALTERNATING CURRENT MACHINES
39.	UME805	ROBOTICS ENGINEERING
40.	UME502	AUTOMOBILE ENGINEERING
41.	UEE504	POWER ELECTRONICS
42.	UMT893	CAPSTONE PROJECT (Starts) 4 self-effort hours
43.	UME832	FINITE ELEMENT METHODS
44.	UEI841	ADVANCED CONTROL SYSTEMS
45.	UPE501	WORK STUDY AND ERGONOMICS
46.	UME722	SYSTEM MODELLING AND SIMULATION
47.	UME844	MACHINE TOOL DESIGN
48.	UEC705	IMAGE PROCESSING AND
49.		COMPUTER VISION
50.	UCS521	ARTIFICIAL INTELLIGENCE
51.	UEC742	MEMS
52.	UEI846	BIO□MEDICAL DSP
53.	UEI831	BIO□SENSOR AND MEMS
54.	UEI844	VIRTUAL

55.	UHU006	INTRODUCTORY COURSE IN FRENCH
56.	UCS001	INTRODUCTION TO CYBER SECURITY
57.	UHU007	EMPLOYABILITY DEVELOPMENT SKILLS
58.	UEN004	TECHNOLOGIES FOR SUSTAINABLE DEVELOPMENT
59.	UHU008	INTRODUCTION TO CORPORATE FINANCE
60.	UHU009	INTRODUCTION TO COGNITIVE SCIENCE
61.	UPH063	NANO SCIENCE AND NANO-MATERIALS
62.	UMA066	GRAPH THEORY AND APPLICATIONS

UEC507: MICROPROCESSOR AND MICROCONTROLLER

L	T	P	Cr.
3	1	2	4.5

Course objectives: To Introduce the basics of microprocessors and microcontrollers technology and related applications. Study of the architectural details and programming of 16 bit 8085 microprocessor and its interfacing with various peripheral ICs; Study of architecture and programming of 8051 processor.

Course learning outcomes (CLOs): The student will be able to

1. acquire knowledge about microprocessors and its need
2. write the programs using 8085 and 8086 microprocessor
3. know the internal architecture and interfacing of different peripheral devices with 8085 and

   8086 microprocessor
4. design the system using 8051 processors.

UMT696: GROUP PROJECT

L	T	P	Cr
-	-	-	**13.0**

Course Objectives: To develop design skills according to a Conceive-Design-Implement-Operate (CDIO) compliant methodology. To implement engineering skill and knowledge to complete the identified project work while encouraging creativity and innovation. To develop spirit of team work, communication skills through group-based activity and foster self- directing learning and critical evaluation.

Course Learning Outcomes (CLOs):

The students will be able to

1. identify a problem based on the need analysis of community /industry/ research.
2. create a flowchart of methodology for solving the identified problem
3. demonstrate team work with work division, team meetings and communications among team members.
4. write technical report for the project work and present the same through power point presentations or posters.

UMT893: CAPSTONE PROJECT

	L	T	P	Cr.
UMT7XX: Semester VII Part-I (Starts)	**0**	**0**	**2**	**--**
UMT8XX: Semester VIII Part-II Completion)	**0**	**0**	**2**	**8.0**

Course Objectives: Implement the project in a group for designing and fabrication of a mechatronic system. Do a detailed design of the system considering various criterion

and decision making for optimization. Use various resources like books, research literature, internet, CAD CAE software tools, for refining the system design to make it practical. Detailed design record in the form of document, spread sheets, graphs, tables, images, videos and presentations for review and evaluation.

A project based course to teach integrated approach to the design of mechatronic systems using concepts of mechanical, electrical, electronics and computer engineering courses studied in the previous semesters. The mechatronic systems are to be introduced / reviewed the concepts of Morphology of design. Detailed flow chart of stages of design. Design of integrated mechatronic systems. Top down – bottom up design. Designing for satisfying requirements of reliability, robustness, integration of multidisciplinary sub-systems, stability and control. Optimized design, manufacturing, assembly, installation, maintenance, cost, transportation-to-site aspects and the use of a system design approach using various courses already studied by the students and guide in the use of software tools specific to the selected project. Use of Excel spreadsheet for design calculations and iterations. CAD design: mechanism design and analysis, kinematic and dynamic using ProEngineer/Creo. Electronic control system design using Lab View. Sensitivity studies for feasibility and optimization of mass properties. Finite Element Analysis: FEA fundamentals. Types of analysis. Types of simplifications used in FEA to reduce time and model complexity. Use of Pro/Mechanic for analysis. Sensitivity, Feasibility, and Optimization studies in FEA. Animated assembly sequence. Production drawings using CAD s/w: views, dimensioning, x-sections, BOM, Ballooning, Assembly-exploded & simplified views, tolerance, machining symbol.

UMT802: INDUSTRIAL AUTOMATION

L	T	P	Cr
3	0	2	4.0

Course objectives: This course imparts adequate background on state of art automation technologies as well as to provide hands-on knowledge to truly appreciate the contemporary
automation technologies, the integration and application in modern manufacturing industries. Demonstrates problem-solving skills in automation with circuits design and ability to do the interfaces of different sensors, controllers and actuators as per application criteria. Also, introduces the practical methods of automatic control of advance machines, critical processes, systems and also new enabling technologies for reshaping the manufacturing practices.

Course learning outcomes (CLOs): The students will be able to

1. analyze and comprehend the benefits and applications of automation technologies in various contemporary manufacturing systems
2. design and simulate a system or process to meet desired requirements of automation within realistic constraints of various logic circuits on software and the same can be applied to automate the different processes in contemporary industry systems
3. develop automation technologies by using the different automation approaches and skills to solve the complex industrial problems necessary for contemporary engineering practice

UEC742: MEMS

L	T	P	Cr
3	1	0	3.5

Course objectives: To educate the student to understand the fundamentals of Micro Electro Mechanical Systems (MEMS), different materials used for MEMS, semiconductors and solid mechanics to fabricate MEMS devices, various sensors and actuators, applications of MEMS to disciplines beyond Electrical and Mechanical engineering.

Course Learning Outcomes (CLOs): The student will be able to

1. integrate the knowledge of semiconductors and solid mechanics to fabricate MEMS devices
2. analyze operation of micro devices, micro systems and their applications
3. design the micro devices using the MEMS fabrication process
4. apply different materials used for MEMS

UEC705: IMAGE PROCESSING AND COMPUTER VISION

L	T	P	Cr
3	1	0	3.5

Course objective: To make students understand image fundamentals and how digital images can be processed, Image enhancement techniques and its application, Image compression and its applicability, fundamentals of computer vision, geometrical features of images, object recognition and application of real time image processing.

Course learning outcome (CLO):

Upon completion of the course, the student will be able to:

1. Fundamentals of image processing.
2. Basic skills to enhancing images.
3. Fundamental and state of the art image compression standards.
4. Real time image processing with computer vision.

UCS521: ARTIFICIAL INTELLIGENCE

L	T	P	Cr
3	1	0	3.5

Course objective: To be familiar with the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, machine learning, knowledge acquisition and learning methods in solving particular engineering problems.

Course learning outcomes (CLOs):

On completion of this course, the students will be able to

1. Learn the basics and applications of artificial intelligence and categorize various problem domains, basic knowledge representation and reasoning methods.
2. Analyze basic and advanced search techniques including game playing, evolutionary search algorithms, constraint satisfaction.
3. Learn and design intelligent agents for concrete computational problems.
4. Design of programs in AI language(s).
5. Acquire knowledge about the architecture of an expert system and design new expert systems for real life applications.

UEI844: VIRTUAL INSTRUMENTATION

L	T	P	Cr.
2	0	3	3.5

Course Objective: The objective of this course is to introduce the concept of virtual instrumentation and to develop basic VI programs using loops, case structures etc. including its applications in image, signal processing and motion control.

Course Learning Outcomes (CLO): After the completion of the course student will be able to :

1. demonstrate the working of LabVIEW.
2. explain the various types of structures used in LabVIEW.
3. analyze and design different type of programs based on data acquisition.
4. demonstrate the use of LabVIEW for signal processing, image processing etc.
5. use different analysis tools

UEC816: BASICS OF COMMUNICATION ENGINEERING

Prerequisites: A course on signal and system.

L	T	P	Cr
2	1	2	3.5

Course Objectives: The aim of this course is to introduce students to the theory and application of communication systems. To provide students the knowledge of analog and digital communication system this includes AM, FM, PM, PCM and digital modulation technique.

Course Learning Outcomes (CLOs): The student will be able to

1. explain the principles of modulation.
2. describe and explain a number of analog modulation schemes and calculate bandwidth and power consumption of the different schemes.
3. describe and explain a number of digital modulation techniques.
4. apply the concepts of sampling and TDM to determine the data rate and bandwidth of digital signal.
5. explain the principle of telephony.