MAHENDRA COLLEGE OF ENGINEERING
(Approved by AICTE, Affiliated to Anna University, Chennai-25)
Minnampalli, Salem – 636 106

B.E. MECHATRONICS ENGINEERING

Program Outcomes (POs)

Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design / Development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

The graduates will be able to

PSO 1: Inculcate Knowledge in Basic Engineering Sciences and Fundamentals of Mechanical, Electronics and Electrical Engineering.
PSO 2: Create ability to Design, Develop Product and applications in the field of Automation and Mechatronics.
PSO 3: Prepare Graduates to be valuable Engineers with excellent logical and Problem solving skills in a multidisciplinary environment.

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COURSE OUTCOME STATEMENTS FOR B.E.MECHATRONICS ENGINEERING (2013 REGULATIONS)		
SEMESTER 01		
1.Course Code and Name : HS6151 - TECHNICAL ENGLISH I		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Classify the types of listening and writing skills with acquired knowledge	K2
2	Demonstrate speaking skills in various occasions	K2
3	Compare the formal and informal writing skills by using the mail and blocks	K2
4	Apply the speaking etiquitte to build up communication proficiency	K3
5	Develop presentations with the use of LSRW skills	K3
2.Course Code and Name : MA6151 - MATHEMATICS I		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Solve the Eigen values and Eigen vectors to diagonalise and reduce a matrix to quadratic form	K3

2	Identify the convergences, divergences of infinite series	K3
3	Solve evolutes and envelopes of a given curve by using radius of curvature and center of curvature	K3
4	Identify the maxima and minima value functions of two variables	K3
5	Solve area of plain curves and volume of solid using double and triple integrals	K3

3.Course Code and Name : PH6151 - ENGINEERING PHYSICS I		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Explain the basics of properties of matter and its applications	K2
2	Summarize the concepts of waves and optical devices and their applications in fiber optics	K2
3	Demonstrate the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers	K2
4	Outline the concepts of advanced physics quantum theory and its applications in tunneling microscopes	K2
5	Explain the basics of crystals, their structures and different crystal growth techniques	K2

4.Course Code and Name : CY6151 - ENGINEERING CHEMISTRY I		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Classify the polymers and their utility in the industries and explain the techniques of polymerization and properties of polymers	K2
2	Relate various thermodynamic functions such as enthalpy, entropy, free energy and their importance	K2
3	Explain the photo physical processes such as fluorescence and phosphorescence and various components of UV and IR spectrophotometer	K2
4	Illustrate the phase transitions of one component and two component systems and the types of alloys and their application in industries	K2
5	Outline the synthesis, characteristics and the applications of nano materials	K2

5.Course Code and Name : GE6151- COMPUTER PROGRAMMING

	CO Statements	Knowledge Level
The students should be able to		
1	Describe the function of a Computer and problem solving techniques.	K2
2	Write simple C programs using basic constructs	K3
3	Implement applications to manage data using arrays and strings	K3
4	Apply functions and pointers for solving problems	K3
5	Develop simple applications using structure and union	K3

6.Course Code and Name : GE6152- ENGINEERING GRAPHICS		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Demonstrate freehand sketching of basic geometrical constructions and multiple views of objects	K2
2	Develop orthographic projections of points, lines and plane surfaces	K3
3	Construct projections of simple solids and truncated solids	K3
4	Develop projection of sectioned solids and utilize development of surfaces	K3
5	Construct isometric and perspective projections of simple solids	K3

7.Course Code and Name : GE6161- COMPUTER PRACTICES LABORATORY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Apply the usage of office automation tools.	K2
2	Apply good programming design methods for program development.	K3
3	Design and implement C programs for simple applications.	K3
4	Develop recursive programs.	K3

8.Course Code and Name : GE6162 - ENGINEERING PRACTICES LABORATORY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Construct carpentry components and pipe connections including plumbing works	K2
2	Make use of welding equipments to join the structures	K3
3	Develop models using sheet metal work	K3

4	Illustrate the working of centrifugal pump and air conditioner	K3
5	Demonstrate basic home electrical works, measurement of the electrical quantities and soldering practices	K3

9.Course Code and Name : GE6163 - PHYSICS AND CHEMISTRY LABORATORY - I		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Make use of spectrometer to find the wavelength of spectral lines, and laser	K3
2	Make use of ultrasonic interferometer and Lee's disc apparatus to find the velocity of sound, compressibility of the liquid and thermal conductivity	K3
3	Demonstrate the estimation of DO content in water sample by Winkler's method and molecular weight of polymer by Ostwald viscometer	K2
4	Experiment with the strength of an acid using pH meter and conductometer	K3
5	Demonstrate the estimation of weak and strong acids in a mixture by conductometer	K2

SEMESTER 02		
1.Course Code and Name : HS6251 - TECHNICAL ENGLISH II		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Develop the communication skills with proper grammar usage	K2
2	Summarize the various advanced technical and non-technical english tools	K2
3	Classify the speaking skills and expression through professional english	K2
4	Apply the interview techniques for career development	K3
5	Outline the use of writing skills to express innovatiove ideas	K3
2.Course Code and Name : MA6251 - MATHEMATICS II		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Apply solenoidal, irrotational vectors and make use of the concepts of Green's, Gauss divergence , Stokes theorem to evaluate single, double and triple integrals	K3
2	Solve simultaneous linear equations and P.I. of Cauchy and Legendre Equation	K3

3	Solve Laplace Transforms of periodic functions and ODE using Inverse Laplace Transform	K3
4	Make use of the properties of analytic functions for verifying C-R equations for determination of Bilinear Transformation	K3
5	Develop the functions of two variables as Taylor's and Laurent's series and Contour integrals by using Cauchy's Integral formula	K3

3.Course Code and Name : PH6251 - ENGINEERING PHYSICS II		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Explain the basics, properties and applications of conducting materials	K2
2	Summarize the properties of semiconducting materials and semiconductor devices.	K2
3	Explain the basics, properties and applications of the magnetic materials and super conducting material	K2
4	Illustrate the concepts, mechanisms and applications of dielectric materials	K2
5	Outline the method of synthesis and explain the properties of Nano materials, SMA, Metallic glasses and Ceramics	K2

4.Course Code and Name : CY6251 - ENGINEERING CHEMISTRY II		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Explain the problems of using hard water in boilers and methods of treatment of water for boiler use	K2
2	Apply the design principles to electro chemical cell. Identify the types of corrosion and the methods of prevention	K3
3	Illustrate the methods of harnessing energy from non-conventional energy sources	K2
4	Classify various engineering materials and explain their importance	K2
5	Relate the significance of solid, liquid and gaseous fuels. Explain the calorific values of fuels and air requirement for combustion in furnaces	K2

5.Course Code and Name : GE6252- BASIC ELECTRICAL AND ELECTRONICS ENGINEERING		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Apply the basic theorems to solve problems in Electrical circuits	K3
2	Classify the different components and function of electrical machines	K2
3	Summarize the characteristics of electronic components	K2
4	Outline the basic concepts of communication engineering	K2
5	Solve design problems in digital electronic circuits	K3

6.Course Code and Name : GE6253- ENGINEERING MECHANICS		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Develop the vectorial and scalar representation of forces and moments	K3
2	Solve problems pertaining to rigid bodies in equilibrium	K3
3	Identify the properties of surfaces and solids like centriod and moment of inertia etc.	K3
4	Solve problems pertaining to rigid bodies under the effect of dynamic forces	K3
5	Apply the laws of friction for the solution of simple rigid bodies	K3

7.Course Code and Name : GE6261 - COMPUTER AIDED DRAFTING AND MODELING LABORATORY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Develop front view and top view of simple solids and objects	K3
2	Construct isometric projection and sectional views of objects and simple solids	K3
3	Construct plan of a residential building	K3
4	Demonstrate the drawing of truss and curves	K2
5	Model simple objects and construct 2-D multi-view drawings from 3-D using drafting software	K3
8.Course Code and Name :GE6262- PHYSICS AND CHEMISTRY LABORATORY - II		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Illustrate the determination of Young's modulus of the beam and moment of inertia and rigidity modules of thin wire Torsion pendulum	K2

2	Make use of Poiseuille's method to determine the coefficient of viscosity of the liquid	K3
3	Illustrate the determination of dispersive power of a prism and the thickness of a thin wire through interference fringes using Air wedge apparatus	K2
4	Experiment with the type, amount of alkalinity, hardness in a given water sample and evaluate the Amount of copper using EDTA method	K3
5	Demonstrate titration by potentiometric redox and conductometric precipitation methods	K2

SEMESTER 03		
1.Course Code and Name : MA6351 - TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Solve differential equations using Fourier series analysis for engineering applications.	K1
2	Utilize Dirichlet's condition for finding the Fourier series of a given function	K2
3	Apply Fourier series to solve one dimensional way, one and two dimensional heat equations.	K2
4	Solve Fourier transform for a given function and make use of them to evaluate certain definite Integrals	K2
5	Solve Z transforms of standard functions and make use of them to solve difference equations	K2
2.Course Code and Name : CE6306 STRENGTH OF MATERIALS		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Summarize the concepts of stress and strain in simple and compound bars, the importance o	K2
2	Construct the load transferring mechanism in beams and stress distribution due to shearing	K3
3	Apply basic equation of simple torsion in designing of shafts and helical spring.	K3
4	Identify the slope and deflection in beams using different methods.	K3
5	Analyze and design thin and thick shells for the applied internal and external pressures.	K4
3.Course Code and Name : CE6451 - FLUID MECHANICS AND MACHINERY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Explain the effect of fluid properties on a flow system and Identify type of fluid flow pattern	K2

2	Develop the experiments and analyse data on different types of loses in pipes of varying cros	K3
3	Plan the use dimensional analysis concept in flow problem.	K3
4	Identify a performance parameters of a given Centrifugal pump.	K3
5	Show the characteristic curves of hydraulic machines.	K2
4.Course Code and Name : EC6302 DIGITAL ELECTRONICS		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Analyze different methods used for simplification of Boolean expressions.	K2
2	Design and implement Combinational circuits.	K3
3	Design and implement synchronous and asynchronous sequential circuits.	K3
4	Write simple HDL codes for the circuits.	K2
5.Course Code and Name :EE6358 ELECTRICAL MACHINES AND DRIVES		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Explain the elements of electrical drives	K2
2	Outline drive motor characteristics	K2
3	Summarize the starting method of DC and AC motors	K2
4	Illustate the conventional speed control of DC and AC drives	K2
5	Infer the concepts of Solid State speed Control of DC and AC drives	K2
6.Course Code and Name : ME6401 KINEMATICS OF MACHINERY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Explain the basics of mechanism	K2
2	Analyse the assembly with respect to the displacement, velocity and acceleration	K4
3	Construct the CAM profiles	K3
4	Analyse problems on gears and gear trains	K4
5	Identify the friction in machine elements	K3
7.Course Code and Name : CE6461 FLUID MECHANICS AND MACHINERY LABORATORY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Identify the flow in pipes	K3

2	Examine the frictional losses in pipes	K4
3	Develop characteristics of pumps	K3
4	Develop characteristics of turbines	K3
5	Analyze the metacentric height of floating bodies	K4
8.Course Code and Name : EE6362 ELECTRICAL MACHINES AND DRIVES LABORATORY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Ability to do characteristics of different electrical motors.	K2
2	To analyze the performance characteristics of single phase and Polyphase Induction Machines.	K2
3	To understand and analyze the concept of synchronous motor by conducting (or) demonstration through load test.	K2
4	To conduct the load test on single phase transformer for analyzing the performance characteristics.	K5
5	To Perform loading and speed control on DC Shunt Machine .	K4
9.Course Code and Name: MT6311 COMPUTER AIDED MACHINE DRAWING		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Ability to develop engineering drawing for the industrial component using Indian Standard code of practice.	K2
2	Ability to develop 2D and 3D models of the component using manual/software	K2
3	Develop 2D and 3D models using modeling softwares.	K2
SEMESTER 04		
1.Course Code and Name : MA6452 STATISTICS AND NUMERICAL METHODS		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Apply the concept of testing of hypothesis for small and large samples in real life problems.	K3
2	Utilize the basic concepts of classifications of design of experiments in the field of agricultur	K3
3	Develop the numerical techniques of interpolation in various intervals and apply the numeric	K3
4	Understand the knowledge of various techniques and methods for solving first and second o	K2
5	Solve the partial and ordinary differential equations with initial and boundary conditions by u	K3

2.Course Code and Name : ME6505 DYNAMICS OF MACHINES		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Solve static and dynamic forces of mechanisms	K3
2	Summarize the balancing masses and their locations of reciprocating and rotating masses	K2
3	Determine the frequency of free vibration and damping	K2
4	Explain the frequency of forced vibration and damping coefficient	K2
5	Illustrate governor variables and estimate the gyroscopic effect on automobiles, ships and ai	K2
3.Course Code and Name : EC6405 CONTROL SYSTEM ENGINEERING		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Illustrate various modeling techniques for control systemdesign	K2
2	Analyse the control systems using different methods	K4
3	Analyse frequency domain analysis of control systems required for stability analysis	K4
4	Analyse the compensation techniques that can be used to stabilize control systems	K4
5	analyse state variables of the system	K4
4.Course Code and Name : ME6352 MANUFACTURING TECHNOLOGY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	The Students can able to use different manufacturing process and use this in industry for component production	K2
2	Explain different metal casting processes, associated defects, merits and demerits	K2
3	Compare different metal joining processes.	K2
4	Summarize various hot working and cold working methods of metals.	K2
5	Identify the Work on various sheet metal making processes.	K3
5.Course Code and Name : ME6504 METROLOGY AND MEASUREMENTS		
	CO Statements	**Knowledge Level**
The students should be able to		

1	Explain the basics of standards of measurement, limits, fits &tolerances industrial applicatior	K2
2	Identify the uses of gauges and comparators.	K3
3	Understand the significance of measurement system, errors, transducers, intermediate modif	K2
4	Comprehend the fundamentals of thermocouple and strain measurement.	K2
5	Illustrate the measurement of field variables like force, torque and pressure.	K2
6.Course Code and Name : MT6401 MICROPROCESSORS AND APPLICATIONS		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Explain the architecture and the concepts of 8085 microprocessor	K2
2	develop simple assembly language programming (ALP) using 8085 microprocessor	K3
3	Explain the architecture, memory organization, data & I/O transfer and interrupt concepts o	K2
4	compare the functions of 8085 and 8051	K2
5	apply the usage of 8051 microcontroller in real time application	K3
7.Course Code and Name : MT6411 MICROPROCESSOR LABORATORY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Develop an ALP for fixed and Floating Point and Arithmetic	K6
2	Develop an ALP for Interface different I/Os with processor	K6
3	Develop an ALP to Generate waveforms using Microprocessors	K6
4	Ability to use the microprocessor to perform simple programmes like addition, subtraction, multiplication, division	K2
5	Ability to use the microprocessor for interfacing for conversion of signals.	K2
8.Course Code and Name : ME6465 MANUFACTURING TECHNOLOGY LABORATORY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Explain the mechanism of material removal processes.	K2
2	Ability to use different machine tools to manufacturing gears.	K2
3	Ability to use different machine tools for finishing operations	K2
4	Ability to manufacture tools using cutter grinder	K2

5	Develop CNC part programming	K2

9.Course Code and Name : ME6511 DYNAMICS LABORATORY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Demonstrate the principles of kinematics and dynamics of machinery	K2
2	Explain the measuring devices for dynamic testing	K2
3	Solve the mass moment of inertia of mechanical element, governor effort and range s	K3

SEMESTER 05		
1.Course Code and Name : ME6503 DESIGN OF MACHINE ELEMENTS		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Explain the influence of steady and variable stresses in machine component design.	K2
2	Apply the concepts of design to shafts, keys and couplings.	K3
3	Apply the concepts of design to temporary and permanent joints.	K3
4	Apply the concepts of design to energy absorbing members, connecting rod and crank shaft.	K3
5	Apply the concepts of design to bearings.	K3

2.Course Code and Name : EE6503 POWER ELECTRONICS		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Compare different types of power semiconductor devices and their switching characteristics	K2
2	Explain the operation, characteristics and performance parameters of controlled converters	K2
3	Explain different modulation techniques of pulse width modulated inverters.	K2
4	Explain the operation of control circuits to HVDC, UPS and tap changing transformer.	K2
5	Explain the operation, characteristics and performance parameters of DC-DC choppers	K2

3.Course Code and Name : MT6501 SENSORS AND SIGNAL PROCESSING		
	CO Statements	**Knowledge Level**
The students should be able to		

1	The students will be able to use various Sensors	K2
2	The students will be able to use various electrical and mechanical instruments in industries.	K2
3	Define units and standards, elements of measurement system and error analysis	K2
4	Understand the static and dynamic characteristics of transducers.	K2

4.Course Code and Name : GE6351 ENVIRONMENTAL SCIENCE AND ENGINEERING		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Illustrate the concepts of an ecosystem , energy flow and conservation of biodiversity.	K2
2	Explain the causes, effects and control of various types of pollution.	K2
3	Outline the conservation of natural resources.	K2
4	Summarize the social issues of environment and legislative guidelines for disaster management.	K2
5	Relate population growth and its impact on environment and human health.	K4

5.Course Code and Name : MF6505 CNC MACHINING TECHNOLOGY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Upon completion of this course the student and can to provide knowledge on principles	K2
2	Understand the constructional features, programming, tooling and workholding devices in CNC machine tools	K2
3	Understand the CNC control in modern manufacturing system.	K2
4	Construct the CNC part programming and perform manufacturing.	K3

6.Course Code and Name : MT6502 THERMODYNAMICS PRINCIPLES AND APPLICATIONS		
	CO Statements	**Knowledge Level**
The students should be able to		
1	The students will be able to apply the thermodynamics laws in the design of I.C engines , air conditioning and refrigeration equipments	K2

2	Apply the first law of thermodynamics for simple open and closed systems.	K3
3	Construct the second law of thermodynamics and apply to open and closed systems	K3
4	Make use of Rankine cycle to steam power plant and compare few cycle improvement meth	K3
5	Classify the simple thermodynamic relations of ideal and real gases	K2

7.Course Code and Name : MT6511 POWER ELECTRONICS LABORATORY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Ability to use SCR, MOSFET, TRIAC in electronic circuit	K2
2	Ability to perform characteristic study on the electronics components	K2
3	Analyze characteristics of AC to DC fully controlled converter, half-controlled converter ar	K4
4	Analyze characteristics of single phase and three phase IGBT PWM inverter	K4

8.Course Code and Name : SENSORS AND SIGNAL PROCESSING LABORATORY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Ability to use the sensors for the measurement of different signals and use of signal processing techniques to convert them to useful signal.	K2

9.Course Code and Name : MT6513 CNC LABORATORY		
	CO Statements	**Knowledge Level**
The students should be able to		

1	Ability to write manual part programming using G code and M code for simple components	K2
2	Ability to operate CNC controlled machine tools	K2
3		

SEMESTER 06		
1. Course Code and Name : MG6851 PRINCIPLES OF MANAGEMENT		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Summarize the evolution of management concepts.	K2
2	Classify the functions and principles of management	K2
3	Plan the use of POM tools for domain specific applications in an organization	K2
4	Demonstrate the application of various motivational theories to enrich the proper leadership qualities in an organization.	K2
5	Summarize the various budgetary Techniques.	K2
2. Course Code and Name : MT6601 MICROCONTROLLER AND PLC		
	CO Statements	**Knowledge Level**
The students should be able to		
1	The students will learn the theory, programming and application of microcontroller	K2
2	The students will learn design of systems using Programmable Logic Controllers	K2
3	Develop Memory Interfacing circuits.	K3
4	Develop 8051 microcontroller based systems	K3
3. Course Code and Name : MT6602 APPLIED HYDRAULICS AND PNEUMATICS		
	CO Statements	**Knowledge Level**
The students should be able to		

1	The students will be able to operate and maintain various pneumatic and hydraulic systems in industrial environments.	K2
2	Understanding operating principles and constructional features of hydraulic and pneumatic systems.	K2
3	Knowledge with selection of hydraulic / pneumatic components	K2
4	Understand of designing and layout of Hydraulic Power package and trouble shooting.	K3

4. Course Code and Name : MT6603 DESIGN OF MECHATRONICS SYSTEM		
	CO Statements	**Knowledge Level**
The students should be able to		
1	The students will be able to design systems in mechatronics approach using modern software packages.	K2
2	Familiar with basic system modelling	K2
3	Understand the concepts of engineering system and dynamic response of the system	K2
4	Realize the concepts of real time interfacing and data acquisition	K3
5	Understanding the concepts of design of Mechatronics system through case studies	K2

5. Course Code and Name : MT6604 OBJECT ORIENTED PROGRAMMING IN C++		
	CO Statements	**Knowledge Level**
The students should be able to		
1	The students will be able to develop C++ programs for object oriented systems and test the systems	K2
2	CO2: Define the fundamental concepts in programming with C++.	K2
3	Identify classes and objects from the given problem description and able to create classes and obj	K1
4	Achieve code reusability and extensibility by means of Inheritance and Polymorphism	K2
5	Translate the informal description of an algorithm to solutions for problems in engineering, scienc	K2

6. Course Code and Name : GE6757 Total Quality Management		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Develop an understanding of quality management philosophies and Framework.	K3

2	Discuss the need of customer expectations, employee involvement and Supplier partnership.	K4
3	Analyze the TQM tools and Techniques to improve the product and process Quality.	K4
4	Apply modern tools to improve quality of the product.	K3
5	Explain about ISO 9001, Environmental Management Standards and ISO 14001 Certificatic	K2
7. Course Code and Name: MT6611 MICRO CONTROLLER AND PLC LABORATORY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Ability to use microcontroller and PLC to control different motor/equipment	K4
8. Course Code and Name: MT6612 OBJECT ORIENTED PROGRAMMING LABORATORY		
1	Gain the basic knowledge on Object Oriented concepts.	K3
2	Ability to develop applications using Object Oriented Programming Concepts.	K4
3	Ability to implement features of object oriented programming to solve real world problems	K3
9. Course Code and Name: MT6613 APPLIED HYDRAULICS AND PNEUMATIC LABORATORY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Ability to design and test hydraulic, pneumatic circuits	K2
2	Use of MATLAB/LABVIEW software for simulation of hydraulic, pneumatic and electrical circuits.	K2
3	Select the actuators and valves for the design of fluid power circuits.	K2
4	Design and simulate the fluid power circuits using software tool.	K3
5	Test the simulated output by constructing the fluid power circuits using suitable actuators and valves.	K3

SEMESTER 07		
1. Course Code and Name : MT6701 MEDICAL MECHATRONICS		
	CO Statements	**Knowledge Level**

The students should be able to		
1	Explain different measurement techniques used in physiological parameters measurement.	K2
2	Describe the sensors and signal conditioning circuits used in biomedical engineering.	K2
3	Understand about various amplifiers, recording and display devices.	K2
4	Differentiate the working of recorders and explain the advanced systems used in medicine	K4
5	Understand about various Bio- medical diagnostics instrumentation.	K2
2. Course Code and Name : MT6702 MODELING AND SIMULATION		
	CO Statements	**Knowledge Level**
The students should be able to		
1	The students will be able to design and develop products using simulation techniques.	K2
2	To know the basic concepts of modelling and assembly for different mechanical components	K2
3	To know the different types of CAD standards used in modeling of mechanical components	K2
4	To know about basic concepts of FEA and analysis software for analyzing mechanical components	K3
5	To know about different mathematical techniques used in finite element analysis to solve structural and thermal problems	K3
3. Course Code and Name : MT6703 ROBOTICS AND MACHINE VISION SYSTEM		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Upon completion of this course, the students can able to apply the basic engineering knowledge for the design of robotics	K2
2	Explain the types of grippers and its functions.	K2
3	Evaluate the kinematic calculations and apply Lagrangian and Newton-Euler methods to analyze dynamic characteristics of robots	K3
4	Describing the various programming techniques used in industrial robots	K2
5	Basis of machine vision and apply the concept of image processing	K2

4. Course Code and Name : ME6602 AUTOMOBILE ENGINEERING		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Upon completion of this course, the students will be able to identify the different components in automobile engineering.	K2
2	Have clear understanding on different auxiliary and transmission systems usual.	K2
3	Distinguish the working of different types of transmission systems.	K4
4	Explain the Steering, Brakes and Suspension Systems.	K2
5	Predict possible alternate sources of energy for IC Engines.	K2
5. Course Code and Name : MT6003 ENGINEERING ECONOMICS AND COST ANALYSIS		
	CO Statements	**Knowledge Level**
The students should be able to		
1	The students would be able to remember knowledge of mathematics, economics, and engineering principles to solve engineering problems.	K2
2	Demonstrate any given problems related to mechanical engineering field.	K2
3	The students will be able to carryout cost analysis for capital subjecting based on depreciation, money available , supply of material and demand of products.in their management profession	K3
4	Correlate all theoretical concepts with field problems	K4
5		
6. Course Code and Name : ME6501 Computer Aided Design		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Upon completion of this course, the students can able to use computer and CAD software's for modeling of mechanical components	K2
2	Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics	K2
3	Explain the fundamentals of parametric curves, surfaces and Solids	K2
4	Summarize the different types of Standard systems used in CAD	K2
5	Apply NC & CNC programming concepts to develop part programme for Lathe & Milling Machines	K3
7. Course Code and Name : MT6711 COMPUTER AIDED DESIGN AND COMPUTER AIDED MANUFACTURING LABORATORY		

	CO Statements	Knowledge Level
The students should be able to		
1	The students can able to apply mathematical knowledge in modeling and assembly of parts	K2
2	Model and assemble a given three dimensional engineering components	K3
3	Perform various analyses on simple structures for the application of different loads.	K3
4	Generate CNC programs for a given components to work with CNC machines	K3
5		
8. Course Code and Name : MT6712 ROBOTICS LABORATORY		
1	Know the body type and configurations of industrial robots.	K3
2	Deal with mobile robots using different sensors, links and actuators.	K3
3	Handle a robot model using the robotics simulation software.	K4
4	Clarify various programming techniques used in industrial robots.	K4
5	Simulate kinematic and dynamic analysis of robots and estimate the end effectors of robots.	K4
9. Course Code and Name : MT6713 DESIGN AND FABRICATION PROJECT		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Use of design principles and develop conceptual and engineering design of any components.	K3
2	Ability to fabricate any components using different manufacturing tools.	K5

SEMESTER 08		
1. Course Code and Name : MT6801- AUTOMOTIVE ELECTRONICS		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Know the importance of emission standards in automobiles	K2
2	Understand the electronic fuel injection/ignition component sand their function.	K2
3	Choose and use sensors and equipment for measuring mechanical quantities, temperature and appropriate actuators	K2
4	Diagnose electronic engine control systems problems with appropriated diagnostic tools.	K3
5	Analyses the chassis and vehicle safety system.	K3
2. Course Code and Name :MF6009 Rapid Prototyping		

	CO Statements	Knowledge Level
The students should be able to		
1	Understand the Rapid Manufacturing Principle and process.	K2
2	Understand the operating principles of liquid and solid based additive manufacturing system, includir	K2
3	Discuss the Powder Based Rapid Prototyping Systems.	K2
4	Demonstrate Materials For Rapid Prototyping Systems.	K3
5	Provide knowledge on Reverse Engineering And New Technologies its applications in various fields.	K2
3. Course Code and Name : GE6075-Professional Ethics in Engineering		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Illustrate the principles of human values	K2
2	Demonstrate the techniques and theories of Engineering Ethics	K2
3	Explain the procedure for Engineering As Social Experimentation	K2
4	Summarize the concept of Safety, Responsibilities And Rights	K2
5	Explain the different Global Issues	K2
4. Course Code and Name : MT6811 - Project Work		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Analyze problems in various domains and formulate methodology	K4
2	Develop different solutions and select the optimum solution.	K3
3	Conclude using proper evidence to support them	K4