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# SAIRAM ENGINEERING COLLEGE

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Sai Leo Nagar, West Tambaram, Chennai - 600 044. [www.sairam.edu.in](http://www.sairam.edu.in)

## SRI SAI RAM ENGINEERING COLLEGE

### COURSE OUTCOMES

#### FOURTH YEAR

#### REGULATION 2013

#### Department of Civil

COURS E CODE	ME6702	COURS E NAME	MECHATRONICS	SEM	7
On completion of the course, the students will be able to					
C 402.1	Understand the basic concepts of mechatronics, sensors, their characteristics and their role in various engineering applications.				
C 402.2	Knowledge of microcontroller and microprocessor based on standard architecture and block diagrams.				
C 402.3	Ability to understand various interfacing devices and techniques with respect to real time applications.				
C 402.4	Knowledge of Programmable Logic Controllers (PLCs) for different applications and ability to program using Relays, Timers, Counters and Registers.				
C 402.5	Knowledge on principles of actuators, drives and their design concepts, along with mechatronics design and case studies.				

COURS E CODE	ME6703	COURS E NAME	COMPUTER INTEGRATED MANUFACTURING SYSTEMS	SEM	7
On completion of the course, the students will be able to					
C 403.1	Understand various production types, levels of automation, Lean Manufacturing and Just-in-Time techniques and to solve manufacturing problems				
C 403.2	Analyze process planning concepts with logical steps, inventory, aggregate production, material requirement planning, manufacturing resources and ERP				



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<b>C 403.3</b>	Gain knowledge on group technology and cellular manufacturing systems and their impact in manufacturing areas
<b>C 403.4</b>	Learn components, advantages and applications of flexible manufacturing systems and to solve bottle necking problems
<b>C 403.5</b>	Learn the classification of robots, control systems, programming and various terminologies of sensors

<b>COURS E CODE</b>	<b>GE6757</b>	<b>COURS E NAME</b>	<b>TOTAL QUALITY MANAGEMENT</b>	<b>SEM</b>	<b>7</b>
On completion of the course, the students will be able to					
<b>C 404.1</b>	Develop an understanding on quality management philosophies and frameworks. Define the dimensions of product and service quality. Understand customer focus, orientation, satisfaction, complaints and retention.				
<b>C 404.2</b>	Develop in-depth knowledge on various principles of Total quality management. Understand Quality councils, Employee involvement and continuous process improvement.				
<b>C 404.3</b>	Understand on various Traditional and New management tools and techniques for quality management. Learn the Six sigma, Bench marking and FMEA tools.				
<b>C 404.4</b>	Understand various tools and techniques for quality management like control charts, Quality Function Development, Taguchi quality loss function.				
<b>C 404.5</b>	Understand Quality systems of ISO 9000 and ISO 14000 quality standards and its implementation in manufacturing and service sectors.				

<b>COURS E CODE</b>	<b>ME6005</b>	<b>COURS E NAME</b>	<b>PROCESS PLANNING AND COST ESTIMATION</b>	<b>SEM</b>	<b>7</b>
On completion of the course, the students will be able to					
<b>C 405.1</b>	Understand the different production processes, drawing interpretation and material selection.				



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<b>C 405.2</b>	Calculate the various process parameters in selecting proper jigs and fixtures along with tooling and equipment.
<b>C 405.3</b>	Estimate the material cost, labour cost, overhead and depreciation for manufacturing a product in industry.
<b>C 405.4</b>	Calculate the production cost such as forging, welding, foundry and other shop cost.
<b>C 405.5</b>	Calculate the machining time depending upon the machining process like threading, knurling, drilling, shaping etc.

<b>COURS E CODE</b>	<b>ME6010</b>	<b>COURS E NAME</b>	<b>ROBOTIC S</b>	<b>SEM</b>	<b>7</b>
On completion of the course, the students will be able to					
<b>C 406.1</b>	Obtain a sound knowledge in fundamentals in the context of robot configurations, motion, anatomy and application.				
<b>C 406.2</b>	Know about a wide range of drive system, grippers and end effectors for complex industrial and societal needs.				
<b>C 406.3</b>	Identify the requirements and application of sensors and image processing techniques in context with controlling, decision making and promotion of artificial intelligence.				
<b>C 406.4</b>	Perform various kinematic and dynamic analysis for complex arm design consideration and program for various automation related needs.				
<b>C 406.5</b>	Analyze robots requirements in industry considering safety, economics and maintenance				

<b>COURS E CODE</b>	<b>ME6711</b>	<b>COURS E NAME</b>	<b>SIMULATION AND ANALYSIS LABORATORY</b>	<b>SEM</b>	<b>7</b>
On completion of the course, the students will be able to					



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<b>C 407.1</b>	Model 2D and 3D components using analysing softwares
<b>C 407.2</b>	Evaluate and optimize the drawing models with mathematical modelling techniques
<b>C 407.3</b>	Import and export the drawing models within the workstations

<b>COURS E CODE</b>	<b>ME6712</b>	<b>COURS E NAME</b>	<b>MECHATRONICS LABORATORY</b>	<b>SEM</b>	<b>7</b>
On completion of the course, the students will be able to					
<b>C 408.1</b>	Apply the method of programming in microprocessor and PLC based mechatronics systems.				
<b>C 408.2</b>	Design, simulate and analyse the basic electrical, hydraulic and pneumatic systems with the help of simulation software.				
<b>C 408.3</b>	Design mechatronics systems with microprocessor, PLC and other electrical and electronics controls.				

<b>COURS E CODE</b>	<b>ME6713</b>	<b>COURS E NAME</b>	<b>COMPREHENSION</b>	<b>SEM</b>	<b>7</b>
On completion of the course, the students will be able to					
<b>C 409.1</b>	Understand the fundamentals of engineering knowledge by regular practice of solving multiple choice Questions based on various core engineering subjects.				
<b>C 409.2</b>	Identify the problem and formulate the steps to finding the solutions through Group Discussion.				
<b>C 409.3</b>	Utilize the knowledge acquired from last three years to solve complex engineering problems and which they can apply to design and development of final year projects				



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COURS E CODE	MG6863	COURS E NAME	ENGINEERING ECONOMICS	SEM	8
On completion of the course, the students will be able to					
C 410.1	Explain the fundamental concepts of economics, elements of cost as applicable to engineering and carry out elementary economics analysis.				
C 410.2	Classify values, functions and apply value engineering for critical activity or product with due consideration to enhance productivity and profit.				
C 410.3	Apply various interest formulae to evaluate different alternatives and select the best suited alternative.				
C 410.4	Explain, make and justify equipment replacement decisions in accordance with industrial practices.				
C 410.5	Prepare depreciation schedule based on various depreciation methods. Also evaluate public alternatives based on their merits.				

COURS E CODE	IE6005	COURS E NAME	PRODUCTION PLANNING AND CONTROL	SEM	8
On completion of the course, the students will be able to					
C 411.1	Know the fundamentals of production planning and production control and also perform the Break-Even Analysis				
C 411.2	Apply the work-study procedure and its methods to improve the productivity				
C 411.3	Employ Value analysis procedure to improve product functionality and also able to prepare more effective process plan				
C 411.4	Solve problems related to production scheduling and implement effective production control				
C 411.5	Carry out various analysis to calculate optimum inventory levels and reduce unnecessary activities and spending				



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COURS E CODE	ME6016	COURS E NAME	ADVANCED I.C. ENGINES	SEM	8
On completion of the course, the students will be able to					
C 412.1	Acquire the knowledge on principle and operations of S.I.engines and combustion processes.				
C 412.2	Describe the concepts of charge preparation and combustion processes in C.I.engine and learn the concept of turbo charging in C.I.engine.				
C 412.3	Illustrate the concept of engine emission and norms and its treatment techniques.				
C 412.4	Identify different methods of producing alternate fuels and its suitability to I.C.engines.				
C 412.5	Develop and upgrade the knowledge on recent advances in I.C engine to increase its performance and to reduce the harmful emissions.				

COURS E CODE	ME6811	COURS E NAME	PROJECT WORK	SEM	8
On completion of the course, the students will be able to					
C 413.1	Comprehend an industrial or real life problem and identify right/ real issue with solution.				
C 413.2	Complete the necessary studies and review the literature, design a setup of equipment, complete the analysis				
C 413.3	Write a project report based on the findings.				





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## Department of Computer Science and Engineering

**SUBJECT CODE: CS6701**

**COURSE CODE: C401**

**SUBJECT NAME: CRYPTOGRAPHY AND NETWORK SECURITY**

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

C401.1	Compare Various Cryptographic Techniques
C401.2	Design Secure Applications
C401.3	Apply Secure coding in the developed applications
C401.4	Perceive knowledge in network security designs using available secure solutions such as PGP, SSL, IPSec etc..
C401.5	Improve knowledge and become master in fundamentals of secret and public cryptograpy

**SUBJECT CODE: CS6702**

**COURSE CODE: C402**

**SUBJECT NAME: GRAPH THEORY AND APPLICATIONS**

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

C402.1	Students acquire basic knowledge about graphs and its isomorphism, walks, paths, circuits and connected graphs, Euler graphs and Hamiltonian graphs, and Trees.
C402.2	Students acquire basic knowledge about spanning trees, cut sets ,fundamental circuits, network flows, planar graphs and different representation of planar graphs
C402.3	Students acquire basic knowledge about Colouring , Chromatic partitioning, matching, covering, directed graphs and types, binary relations and Euler graphs.
C402.4	Students acquire basic knowledge about counting principles, permutation and combinations, principle of inclusion and exclusion, derangements and arrangements with forbidden positions
C402.5	Students acquire basic knowledge about generating functions, partition of integers, exponential generating function, summation operator, recurrence relations, method of generating functions.



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**SUBJECT CODE: CS6703**

**COURSE CODE: C403**

**SUBJECT NAME: GRID AND CLOUD COMPUTING**

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

C403.1	Understand and apply grid computing techniques to solve large scale scientific problems.
C403.2	Understand the concepts of grid service models.
C403.3	Identify and apply the concept of virtualization design.
C403.4	Understand and apply the grid and cloud tool kits.
C403.5	Apply the security models in the grid and the cloud environment.

**SUBJECT CODE: CS6704**

**COURSE CODE: C404**

**SUBJECT NAME: RESOURCE MANAGEMENT TECHNIQUES**

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

C404.1	Student is able to define and formulate linear programming problems, solve using appropriate techniques and interpret the results obtained.
C404.2	Able to conduct and interpret post-optimal and sensitivity analysis and explain the primal dual relationship. Also able to formulate and solve Transportation Models and Assignment Models
C404.3	Learns the methods to solve integer programming models; Also understand how to model and solve problems using dynamic programming.dual relationship. Also able to formulate and solve Transportation Models and Assignment Models
C404.4	Learn optimality conditions for single- and multiple-variable unconstrained and constrained non-linear optimization problems, and corresponding solution methodologies.
C404.5	Describe the scope of project planning, and use appropriate techniques to represent and analyse projects with a view to managing resources, minimizing costs, and coping with uncertainty





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**SUBJECT CODE: CS6004**

**COURSE CODE: C405**

**SUBJECT NAME: CYBER FORENSICS**

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

C405.1	Define the concepts of computer forensics.
C405.2	Learn and make use of forensics tools effectively
C405.3	Analyze and validate forensics data.
C405.4	Explain the security issues of network layer and transport layer.
C405.5	Discuss the security issues of the application layer.

**SUBJECT CODE: CS6007**

**COURSE CODE: C406**

**SUBJECT NAME: INFORMATION RETRIEVAL**

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

C406.1	Explain about the IR components and Web Search Engine Framework
C406.2	Interpret various information retrieval models
C406.3	Explain the Web Search Engine architecture and optimization
C406.4	Discuss about Web Link Analysis algorithms and advanced search
C406.5	Demonstrate document text mining techniques and clustering Algorithms

**SUBJECT CODE: CS6711**

**COURSE CODE: C407**

**SUBJECT NAME: SECURITY LABORATORY**

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

C407.1	Apply the cryptographic algorithms for communication
C407.2	Build the various security algorithms and compare security algorithm
C407.3	Develop digital signature for secure data transmission
C407.4	Utilize different open source tools for network security and analysis
C407.5	Demonstrate setup honey pot, installation of root kit and demonstrate intrusion detection system.



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Sai Leo Nagar, West Tambaram, Chennai - 600 044. [www.sairam.edu.in](http://www.sairam.edu.in)**SUBJECT CODE: CS6712****COURSE CODE: C408****SUBJECT NAME: GRID AND CLOUD COMPUTING LABORATORY**

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

C408.1	Make use of the grid and cloud tool kits
C408.2	Design and implement applications on the Grid
C408.3	Design and Implement applications on the Cloud
C408.4	Create virtual machines of different configuration
C408.5	Learning to use Hadoop

**SUBJECT CODE: CS6801****COURSE CODE: C409****SUBJECT NAME: MULTI – CORE ARCHITECTURES AND PROGRAMMING**

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

C409.1	Understand the challenges in parallel and multi-threaded programming.
C409.2	Analyze about the various parallel programming paradigms, and solutions
C409.3	Define the Program Parallel Processors
C409.4	Develop programs using OpenMP and MPI
C409.5	Compare and contrast programming for serial processors and programming for parallel processors.

**SUBJECT CODE: CS6401****COURSE CODE: C410****SUBJECT NAME: HUMAN COMPUTER INTERACTION**

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

C410.1	Explain the computer devices and HCI models.
C410.2	Demonstrate the interactive design basics and HCI software process
C410.3	Identify the stake holders requirements and choose the appropriate models
C410.4	Develop mobile HCI using mobile elements and tools by considering mobile eco system.
C410.5	Design meaningful user interface.



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**SUBJECT CODE: MG6088**

**COURSE CODE: C411**

**SUBJECT NAME: SOFTWARE PROJECT MANAGEMENT**

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

C411.1	Develop a software for Project Management principles.
C411.2	Outline the need for Software Project Managemen.
C411.3	Analyze different techniques for software cost estimation
C411.4	Make the students to understand activity planning and risk management.
C411.5	Understand how to manage people and control projects in an organization.

**SUBJECT CODE: CS6811**

**COURSE CODE:C412**

**SUBJECT NAME: PROJECT WORK**

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

C412.1	Acquire knowledge for the project
C412.2	Choose efficient tools for designing project modules.
C412.3	Analyze and categorize executable project modules
C412.4	combine all the modules through effective team work after efficient testing.
C412.5	Recognize the completed task and compile the project and Demonstrate the project.

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## Department of Electronics and Communication Engineering

Semester : 07	Course code : C401	EC6701 - RF AND MICROWAVE ENGINEERING
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### COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

C401.1	Summarizing the limitations of active and passive components used in Microwave communication system.
C401.2	Students will compare the performance of Microwave devices.
C401.3	Students will able to calculate the S parameter for Multiport Nework.
C401.4	Construct the different Microwave bench to generate Microwave signals.
C401.5	Analyzing the gain, directivity of different Microwave signal amplifiers.
C401.6	Examine different Microwave signal parameters and determining the impedance, Wavelength.

Semester : 07	Course code : C402	EC6702 – Optical Communication and network
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### COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

C402.1	To discuss the various optical fiber modes & configurations.
C402.2	Discuss various signal degradation factors associated with optical fibers.
C402.3	Explain the various optical sources & coupling and their use in the optical communication systems.
C402.4	Explain the operation of optical detectors, receivers and measurements of optical parameters.
C402.5	Analyze the digital transmission and its associated parameters on system performance



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<b>Semester : 07</b>	<b>Course code : C403</b>	<b>EC6703- EMBEDDED REAL TIME SYSTEMS</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C403.1</b>	Describe the architecture and programming of ARM processor.
<b>C403.2</b>	Outline the concepts of embedded systems.
<b>C403.3</b>	Explain the basic concepts of real time Operating system design. Differentiate between the general purpose operating system and the real time operating system.
<b>C403.4</b>	Use the system design techniques to develop software for embedded systems.
<b>C403.5</b>	Model real-time applications using embedded-system concepts.

<b>Semester : 07</b>	<b>Course code : C404</b>	<b>EC 6004 – SATELLITE COMMUNICATION</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C404.1</b>	Analyze the satellite orbits, earth segment and space segment.
<b>C404.2</b>	Design Satellite links.
<b>C404.3</b>	Evaluate satellite performance impairments.
<b>C404.4</b>	Analyze satellite modulation and multiplexing techniques.
<b>C404.5</b>	Design various satellite applications.



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<b>Semester : 07</b>	<b>Course code : C405</b>	<b>EC6005 - ELECTRONIC TESTING</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C405.1</b>	Construct automatic testing system.
<b>C405.2</b>	Analyze different testing equipments.
<b>C405.3</b>	Illustrate and implement analog and mixed signal testing.
<b>C405.4</b>	Demonstrate the need for the test process.
<b>C405.5</b>	Design different testing schemes for circuits.

<b>Semester : 07</b>	<b>Course code : C407</b>	<b>CS6012 – Soft Computing</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C407.1</b>	Identify soft computing techniques in building intelligent machines.
<b>C407.2</b>	Apply neural networks to pattern classification and regression problems.
<b>C407.3</b>	Apply fuzzy logic and reasoning to solve engineering problems.
<b>C407.4</b>	Apply genetic algorithms to optimization problems.
<b>C407.5</b>	Evaluate and compare solutions by various hybrid soft computing approaches.





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Semester : 07	Course code : C408	IT6005 – Digital Image Processing
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

C408.1	Discuss the digital image fundamentals.
C408.2	Elaborate the image enhancement techniques.
C408.3	Illustrate image restoration and segmentation techniques.
C408.4	Describe image compression and wavelet techniques.
C408.5	Utilize to represent image in form of features.

Semester : 07	Course code : C410	EC6007- SPEECH PROCESSING
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

C410.1	To analyze model speech production system and describe the fundamentals of speech
C410.2	To understand and discriminate different speech parameters
C410.3	To evaluate an appropriate statistical speech model for a given application
C410.4	To design and analyze a Speech Recognition system
C410.5	To develop different speech synthesis techniques



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Semester : 07	Course code : C411	EC6008- WEB TECHNOLOGY
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

C411.1	To design and create user interfaces using Java frames and applets.
C411.2	To have a basic idea about Java programming using Java.
C411.3	To create simple Web pages and provide client side validation.
C411.4	To create dynamic web pages using server side scripting
C411.5	To understand the application development process and types

Semester :07	Course code : C412	EC6009 - ADVANCED COMPUTER ARCHITECTURE
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

C412.1	Evaluate performance of different architectures with respect to various parameters.
C412.2	Analyze performance of different ILP techniques.
C412.3	Implement parallel processing architectures.
C412.4	Categorize the parallelism of multi core processors.
C412.5	Classify the memory technologies and I/O systems.



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<b>Semester : 07</b>	<b>Course code : C413</b>	<b>EC6010- ELECTRONICS PACKAGING</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C413.1</b>	Analyze packaging techniques.
<b>C413.2</b>	Construct different semiconductor packages.
<b>C413.3</b>	Illustrate and implement CAD.
<b>C413.4</b>	Demonstrate the need for the surface mount technology.
<b>C413.5</b>	Design different embedded passive technologies

<b>Semester : 07</b>	<b>Course code : C414</b>	<b>EC6011 - ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C414.1</b>	To illustrate the basics of EMI, EMC.
<b>C414.2</b>	To examine EMI coupling mechanism.
<b>C414.3</b>	To impart comprehensive insight about the current EMC standards.
<b>C414.4</b>	To explain EMI test methods and instrumentation.
<b>C414.5</b>	To design solution to EMI Sources, EMI problems in PCB level / Subsystem and system level design.

<b>Semester : 07</b>	<b>Course code : C415</b>	<b>EC6012- CMOS Analog IC Design</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C415.1</b>	Build data conversion circuits.
<b>C415.2</b>	Discuss the calibration techniques of comparators and op-amp.
<b>C415.3</b>	Analyze the calibration techniques of ADC and DAC converters.



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<b>C415.4</b>	Analyze the ADC architecture and performance.
<b>C415.5</b>	Analyze DAC architecture and performance.

<b>Semester : 07</b>	<b>Course code : C416</b>	<b>EC 6013 – ADVANCED MICROPROCESSOR AND MICROCONTROLLER</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C416.1</b>	Analyze and differentiate between CISC and RISC architectures.
<b>C416.2</b>	Design and implement the programs in ARM controllers for practical applications.
<b>C416.3</b>	To design and implement programs in Motorola controllers.
<b>C416.4</b>	To compare and contrast different communication interfaces.
<b>C416.5</b>	Design and implement PIC based systems.

<b>Semester : 07</b>	<b>Course code : C417</b>	<b>EC6014- COGNITIVE RADIO</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C417.1</b>	Illustrate the evolution of software Defined Radio
<b>C417.2</b>	Interpret the basics and architecture of Software Defined Radio.
<b>C417.3</b>	Outline the basics of Cognitive networks
<b>C417.4</b>	Develop the building of Cognitive architecture on SDR architecture
<b>C417.5</b>	Make use of the concept of wireless networks to build next generation networks



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Semester : 07	Course code : C419	EC6016 OPTOELECTRONIC DEVICES
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

C419.1	Analyze optoelectronic device characteristics in detail using concepts from quantum mechanics and solid state physics.
C419.2	Define the principles and functionality of the plasma and LCD display devices and illustrate different types of lasers and LED with distinct properties.
C419.3	Describe fundamental and applied aspects of optoelectronic device physics and its applications to the design and operation of photodetectors.
C419.4	Explain the principle and working of optical modulators.
C419.5	Demonstrate the basic design requirements for optoelectronic integration and identify different material and design elements to accomplish a simple optical communication system.

Semester : 07	Course code : C420	EC6711–Embedded Lab
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

C420.1	Develop skills to write programs in ARM for a specific application.
C420.2	Build systems using memory, A/D and D/A interface with ARM system.
C420.3	Analyze the performance of interrupt.
C420.4	Design systems by writing programs for interfacing keyboard, display, motor and sensor.
C420.5	Formulate a mini project using embedded system.

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<b>Semester : 07</b>	<b>Course code : C421</b>	<b>EC6712 - OPTICAL AND MICROWAVE LABORATORY</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C421.1</b>	Understand the working principle of optical sources, detector, fibers and microwave components.
<b>C421.2</b>	Develop understanding of simple optical communication link.
<b>C421.3</b>	Learn about the characteristics and measurements in optical fiber.
<b>C421.4</b>	Know about the behavior of microwave components.
<b>C421.5</b>	Practice microwave measurement procedures.

<b>Semester : 08</b>	<b>Course code : C422</b>	<b>EC 6801 – WIRELESS COMMUNICATION</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C422.1</b>	Characterize wireless channels.
<b>C422.2</b>	Design a cellular system.
<b>C422.3</b>	Design and implement various signaling schemes for fading channels .
<b>C422.4</b>	Compare multipath mitigation techniques and analyze their performance.
<b>C422.5</b>	Design and implement MIMO system with transmit and receive diversity and analyze their performance.





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Semester : 08	Course code : C423	EC6802 – Wireless Networks
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

C423.1	Plan and design the operation of Wireless networks and protocol stacks.
C423.2	Design and implement wireless network environment for any application using latest wireless protocols and standards.
C423.3	Analyze the basic principles of the latest 3G/4G and WiMAX networks and its architectures.
C423.4	Implement different type of applications for smart phones and mobile devices.
C423.5	Investigate, formulate and Learn latest network strategies.

Semester : 08	Course code : C424	EC6017- RF SYSTEM DESIGN
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

C424.1	Summarizing the limitations of transceiver specifications and architectures.
C424.2	Students will design the impedance matching and amplifiers.
C424.3	Students will able to analyze Feedback and Power Amplifier.
C424.4	Construct the different PLL and frequency synthesizers.
C424.5	Examine different Mixers and Oscillators to calculate the Frequency of Oscillation.

Semester : 08	Course code : C425	CS6003- ADHOC AND SENSOR NETWORKS
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

C425.1	Analyze the wireless and sensor based networks and compute various parameters associated with it.
C425.2	Categorize the MAC protocols and analyze the design issues by comparing the



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	protocols.
<b>C425.3</b>	Calculate and examine the congestion window size in TCP congestion mechanism.
<b>C425.4</b>	Discuss the sensor characteristics and compare the WSN layer protocols based on the analysis of characteristics.
<b>C425.5</b>	Illustrate and analyze the issues of routing in WSN and QoS related performance measurements.

<b>Semester :08</b>	<b>Course code : C426</b>	<b>GE6082-Indian Constitution and Society</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C426.1</b>	Classify the components of Indian Constitution and the definition and duties of a citizen.
<b>C436.2</b>	Interpret the structure and hierarchy of central and state Government.
<b>C426.3</b>	Analyze the functions of judiciary, Parliament and its constituent members.
<b>C426.4</b>	Evaluate the functions and boundaries of central and state governments in respect of their powers, duties and centre, state relationship.
<b>C426.5</b>	Distinguish Indian social structure in respect of caste, religion, language, rights to citizens particularly rights to women, children and weaker sections.

<b>Semester : 08</b>	<b>Course code : C427</b>	<b>EC 6018- Multimedia Compression and communication</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C427.1</b>	List and describe various multimedia components and its characteristics
<b>C427.2</b>	Associate appropriate Audio and video compression techniques



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<b>C427.3</b>	Describe the principles of text and image compression
<b>C427.4</b>	Illustrate VoIP technology and challenges. Explain various network architecture and quality of service
<b>C427.1</b>	List and describe various multimedia components and its characteristics

<b>Semester : 08</b>	<b>Course code : C428</b>	<b>GE6075 – Professional Ethics in Engineering</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C428.1</b>	Distinguish between Moral and Ethics.
<b>C428.2</b>	Summarize the moral theories and ethical inquiries.
<b>C428.3</b>	Evaluate the result of the engineering projects by applying ethical theories.
<b>C428.4</b>	Discuss about professional rights, employ rights and intellectual property rights, safety and risk involved in engineering projects.
<b>C428.5</b>	Judge the role of engineer in environmental issues, computer applications, weapons development, multinational corporations and Corporate Social Responsibility.

<b>Semester : 08</b>	<b>Course code : C430</b>	<b>GEC6019 – DATA CONVERTERS</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C430.1</b>	Enumerate the principle of operation of Sample and Hold circuits.
<b>C430.2</b>	Design and Analyze the Architecture of Switched capacitor Filters and Amplifiers.



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<b>C430.3</b>	Design and Analyze ADC and AC circuits.
<b>C430.4</b>	Evaluate the Performance metrics of ADC and DAC.
<b>C430.5</b>	Discuss various Calibration Techniques.

<b>Semester : 08</b>	<b>Course code : C431</b>	<b>CS6701- CRYPTOGRAPHY AND NETWORK SECURITY</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C431.1</b>	Interpret OSI security architecture and classical encryption techniques, and analyze the concepts of finite fields and number theory.
<b>C431.2</b>	Explain various block cipher and stream cipher models, and designing secure applications based on the principles of public key cryptosystems
<b>C431.3</b>	Evaluate the principles of hash functions and construct secure coding for the applications that implement digital signature in real world situations
<b>C431.4</b>	Utilize secure coding in design principles and identify various intrusion detection systems and be able to achieve highest system security.
<b>C431.5</b>	Develop network security designs using available secure solutions such as PGP, SSL, IPSec etc..

<b>Semester : 08</b>	<b>Course code : C432</b>	<b>GE6757 – Total Quality Management</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C432.1</b>	Summarize the Dimensions and Barriers regarding Quality.
<b>C432.2</b>	Illustrate the TQM Principles .



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<b>C432.3</b>	Demonstrate Tools utilization for Quality improvement.
<b>C432.4</b>	Explain the various types of Techniques used to measure Quality.
<b>C432.5</b>	Apply various Quality Systems and Auditing on implementation of TQM.

<b>Semester : 08</b>	<b>Course code : C433</b>	<b>MG6071- Entrepreneurship Development</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C433.1</b>	Distinguish the types of Entrepreneurs and identify Factors Affecting Entrepreneurial Growth.
<b>C433.2</b>	Analyze Entrepreneurship Development Programs Major Motives Influencing an Entrepreneur and Utilize the stress management techniques.
<b>C433.3</b>	Develop Small Enterprises, Project Formulation, Creative solutions and Build a viable business model.
<b>C433.4</b>	Implement Sources of Finance, Management of working Capital.
<b>C433.5</b>	Prepare a comprehensive business plan and Execute government Policy for Small Scale Enterprises.

<b>Semester : 08</b>	<b>Course code : C434</b>	<b>MG6088 - SOFTWARE PROJECT MANAGEMENT</b>
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C434.1</b>	Understand the need for Software Project management and control.
<b>C434.2</b>	Understand the various activities of Project scheduling, Cost Estimation and evaluation
<b>C434.3</b>	Outline the risk assessment and management process.
<b>C434.4</b>	Apply different models of software process and network planning.
<b>C434.5</b>	Summarize organizational behaviors and management.



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Semester : 08	Course code : C436	EC6811-PROJECT WORK
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## COURSE OUTCOMES (CO)

Upon completion of the course, the students will be able to

<b>C436.1</b>	Develop skills to take up any challenging practical problems and find solution by formulating proper methodology.
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## Department of Electrical and Electronics Engineering

### 7 SEMESTER

#### EE6701 HIGH VOLTAGE ENGINEERING

CO.1	Acquire the knowledge of different types of overvoltage and its impact on power system and protection against them.
CO.2	Understand the nature of various dielectric medium and their different breakdown mechanism.
CO.3	Able to understand the need of generating High voltage in laboratories
CO.4	Explain the various methods of measurements of High voltage
CO.5	Understand the methods of testing of various power apparatus and the need for insulation coordination.

#### EE6702 - PROTECTION & SWITCHGEAR

CO.1	Understand the different types of faults occur in power systems and various protective schemes available to prevent Power System components from faults.
CO.2	Explain the working of different types of relays used in power system protection.
CO.3	Know how the electrical equipments are protected from faults.
CO.4	Understand the application of modern numerical and static relays in power system components protection.
CO.5	Know the terms used in circuit breakers and construction and working of different types of circuit breakers.

#### EE6703 – SPECIAL ELECTRICAL MACHINES

C403.1	Explain the construction, working of various special electrical machines likes stepper motor, BLDC, SRM, Switched reluctance motor, PM synchronous motor
C403.2	Understands the torque speed characteristics of various special machines
C403.3	Selection of power controllers according to the application
C403.4	Explain the emf and torque equation of special machines



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C403.5	Knows the advantage and application of special machines

## EE6004- FLEXIBLE AC TRANSMISSION SYSTEMS

C405.1 (CO1)	Discuss the reactive power control techniques.
C405.2 (CO2)	Describe on Static Var Compensator and its applications.
C405.3 (CO3)	Explain the basic concept of Thyristor controlled series capacitor
C405.4 (CO4)	Interpret on STATCOM devices.
C405.5 (CO5)	Integrate the different FACTS controllers.

## EE 6008 MICROCONTROLLER BASED SYSTEM DESIGN

C406.1(C01)	To introduce the architecture of PIC controller
C406.2(C02)	Explain the basic concept of timers and interrupts
C406.3(C03)	Describe about interfacing with peripheral devices
C406.4(C04)	To introduce the basic concepts of ARM processor
C406.5(C05)	To develop assembly language program in ARM processor

## EE6711-POWER SYSTEM SIMULATION LABORATORY

C407.1	Acquire the knowledge of conductor modelling and to calculate the parameters used for design
C407.2	To choose the various load flow analysis for calculating the transmission line losses
C407.3	To study the various fault Analysis and to label the fault current
C407.4	To indicate the generation strategy and to tabulate the dispatch calculation



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## EE6712- COMPREHENSION

C408.1	Recollect the fundamental knowledge of the Electrical and Electronics Engineering
C408.2	Learn the theoretical and mathematical occurrences of the various concepts
C408.3	Learn to correlate the concepts of various subjects to each other
C408.4	Think and design intellectually which improves the reasoning capability related to the program
C408.5	Apply the fundamental knowledge gained in analyzing the future scope and career

## 8 SEMESTER

### E6801 ELECTRIC ENERGY GENERATION, UTILIZATION AND CONSERVATION

C409.1	Choose an electric drive for a particular type of traction, understand different type of braking methods and able to calculate total energy consumption for electric railway system.
C409.2	Understand the working of different lamps and able to design lighting schemes.
C409.3	Design heating elements for electric heating methods and understand the different types of electric welding methods.
C409.4	Conserve energy by the usage of solar energy for generating electric power.
C409.5	Conserve energy by using wind energy to produce electric energy.

### EE6009 - POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS (ELECTIVE-IV)

C410.1 (CO1)	Understand the economic and engineering aspects of electrical engineering generation.
C410.2	Understand and explain the construction ,principle and operation of advanced



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(CO2)	machines whose features enhances energy generating systems
C410.3 (CO3)	Apply and explore power electronic converters to solar photo voltaic system and wind energy system
C410.4 (CO4)	To analyse the grid integrated solar PV system and wind energy system
C410.5 (CO5)	To understand the feasibility of hybrid energy systems .

## GE6075-PROFESSIONAL ETHICS (ELECTIVE –V)

<b>C416.1(CO1)</b>	Learn the moral, social values , Empathy and yoga basics
<b>C416.2(CO2)</b>	Gain knowledge of Kohlberg's theory , Gilligan's theory
<b>C416.3(CO3)</b>	Discuss about the global issues and code of conduct
<b>C416.4(CO4)</b>	Apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society
<b>C416.5(CO5)</b>	Acquire the knowledge of Risk Benefit Analysis and Reducing Risk , Respect for Authority,– Collective Bargaining , Confidentiality

## EE6811- PROJECT WORK

C414.1 (CO1)	Find a solution for a specific problem.
C414.2 (CO2)	Prepare presentation and explain the student's solution for a specific problem.
C414.3 (CO3)	create the own model for a project.
C414.4 (CO4)	Do literature reviews relevent to the problem identified.
C414.5 (CO5)	Identify the software which can give all pros and cons for the specific problem and get solutions.



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## Department of Electronics and Instrumentation Engineering

**COURSE NAME: EI6701 INDUSTRIAL DATA NETWORKS**  
(IV Year –VII Semester)

**CODE COURSE: C401**

<b>C401.1</b>	Students are able to understand the basic concepts of data networks.
<b>C401.2</b>	Students are able to understand the basics of inter networking and serial communications.
<b>C401.3</b>	Students are able to understand the HART and Field buses.
<b>C401.4</b>	Students are able to understand the MODBUS, PROFIBUS and other communication protocol.
<b>C401.5</b>	Students are able to understand the industrial Ethernet and wireless communication.

**COURSE NAME: EI6702 LOGIC AND DISTRIBUTED CONTROL SYSTEM**  
(IV Year –VII Semester)    **CODE COURSE: C402**

<b>C402.1</b>	To understand about Programmable Logic Controller (PLC) and their programming languages.
<b>C402.2</b>	To understand about the applications of PLC.
<b>C402.3</b>	To understand about Computer Controlled Systems.
<b>C402.4</b>	To have the knowledge on the architecture and local control unit of Distributed Control System (DCS).



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<b>C402.5</b>	To understand the information with respect to interfaces used in DCS.
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**COURSE NAME: EC6601 VLSI DESIGN**

**(IV Year –VII Semester) CODE COURSE: C403**

<b>C403.1</b>	To understand the basics of MOS Transistor.
<b>C403.2</b>	To understand the basics of Combinational Logic Design and Low power design principles.
<b>C403.3</b>	To understand the basics of sequential logic Design and Low power design principles.
<b>C403.4</b>	To design arithmetic building blocks.
<b>C403.5</b>	To get familiarized with FPGA building block architectures and routing procedures.

**COURSE NAME: EI6703 FIBRE OPTICS AND LASER INSTRUMENTS**

**(IV Year –VII Semester)**

**CODE COURSE: C404**

<b>C404.1</b>	Students will be able to understand the basic concepts of optical fibers.
<b>C404.2</b>	Students will be able to understand about Industrial application of optical fibres.
<b>C404.3</b>	Students will be able to understand the basic concepts of lasers.
<b>C404.4</b>	Students will be able to understand about Industrial application of lasers.
<b>C404.5</b>	Students will be able to understand about Industrial application of Holography and Medical applications of Lasers.





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**COURSE NAME: EI6704 BIOMEDICAL INSTRUMENTATION**  
**(IV Year –VII Semester)**

**CODE COURSE: C405**

<b>C405.1</b>	Students will be able to understand the fundamentals of Biomedical Engineering.
<b>C405.2</b>	Students will be able to understand the measurement of certain important electrical and non-electrical parameters.
<b>C405.3</b>	Students will be able to understand about the acquisition and analysis of electrical parameters.
<b>C405.4</b>	Students will be able to understand the basic principles of different imaging techniques.
<b>C405.5</b>	Students will be able to understand about life assisting, therapeutic and robotic devices.

**COURSE NAME: EE6006 Applied Soft Computing**  
**(IV Year –VII Semester)**

**CODE COURSE: C406**

<b>C406.1</b>	Students are able to understand the concepts of feed forward neural networks
<b>C406.2</b>	Students are able to understand about feedback networks and the applications of neural controller.
<b>C406.3</b>	Students are able to understand about fuzzy and neuro-fuzzy systems
<b>C406.4</b>	Students are able to understand the concepts of fuzzy logic control to real time systems
<b>C406.5</b>	Students are able to understand the concepts of genetic algorithms and its application.



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**COURSE NAME: EC6612 VLSI Design Laboratory**

**(IV Year –VII Semester)**

**CODE COURSE: C407**

<b>C407.1</b>	To study the synthesis of various combinational circuits on Xilinx tool using Hardware Descriptive Language(HDL).
<b>C407.2</b>	To study and verify the combinational and sequential logic circuit using FPGA and schematic.
<b>C407.3</b>	To design and simulate pipelined serial and parallel adder.
<b>C407.4</b>	To study FPGA board and testing on board leds and switches using verilog code.
<b>C407.5</b>	To design a realtime clock, traffic light controller using verilog tools.

**COURSE NAME: EI6711 Instrumentation System Design Laboratory**

**(IV Year –VII Semester)**

**CODE COURSE: C408**

<b>C408.1</b>	Design Instrumentation amplifier and active filters.
<b>C408.2</b>	Design regulated power supply ,V/I and I/V converters.
<b>C408.3</b>	Design of linearizing circuits and cold – junction compensation circuit for thermocouples.
<b>C408.4</b>	Design signal conditioning circuit for strain gauge ,RTD and to design orifice plate,rotameter.
<b>C408.5</b>	Design a PID controller , Control Valve and Study the flow lift Characteristics



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**COURSE NAME: EI6712 Comprehension**

**(IV Year –VII Semester)**

**CODE COURSE: C409**

<b>C409.1</b>	Students will be able to understand the basics of engineering science.
<b>C409.2</b>	Students will be able to understand the basics principles and operations of engineering science.
<b>C409.3</b>	Students will be able to understand the knowledge acquired from the first Semester to Sixth Semester of B.E Degree Course through periodic exercise.
<b>C409.4</b>	Students will have the Ability to review the present technological developments .
<b>C409.5</b>	Students will have the Ability to prepare the present technological developments .

**COURSE NAME: MG6851 Principles of Management**

**(IV Year –VIII Semester)**

**CODE COURSE: C410**

<b>C410.1</b>	Students will have clear understanding of managerial functions like planning.
<b>C410.2</b>	Students will have clear understanding of managerial functions like organising.
<b>C410.3</b>	Students will have clear understanding of managerial functions like staffing.
<b>C410.4</b>	Students will have clear understanding of managerial functions like leading.
<b>C410.5</b>	Students will have clear understanding of managerial functions like controlling.



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**COURSE NAME: EI6801 Computer Control of Processes**  
**(IV Year –VIII Semester)**

**CODE COURSE: C411**

<b>C411.1</b>	Analyze discrete time systems in state variable form
<b>C411.2</b>	Understand and apply computing platform for system identification techniques
<b>C411.3</b>	Design various Digital controllers
<b>C411.4</b>	Understand about multi-loop regulatory control
<b>C411.5</b>	Understand about multivariable regulatory control

**COURSE NAME: GE6075 Professional Ethics in Engineering**  
**(IV Year –VIII Semester)**

**CODE COURSE: C412**

<b>C412.1</b>	Students will be able to acquire moral, social and human values.
<b>C412.2</b>	Students will be able to create an awareness on Engineering Ethics.
<b>C412.3</b>	Students will be able to act as responsible experimenters.
<b>C412.4</b>	Students will have knowledge about the safety, responsibilities and rights
<b>C412.5</b>	Student will be able to apply ethical principles in society for solving global issues.



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**COURSE NAME: EI6811 Project Work**  
**(IV Year –VIII Semester)**

**CODE COURSE: C413**

<b>C413.1</b>	Students can able to solve a specific problem right from its identification.
<b>C413.2</b>	Students are able to understand the literature review till the successful solution.
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## Department of Instrumentation and Control Engineering

**COURSE NAME: EI6701 INDUSTRIAL DATA  
NETWORKS (IV Year –VII Semester) CODE  
COURSE: C401**

<b>C401.1</b>	Students are able to understand the basic concepts of data networks.
<b>C401.2</b>	Students are able to understand the basics of inter networking and serial communications.
<b>C401.3</b>	Students are able to understand the HART and Field buses.
<b>C401.4</b>	Students are able to understand the MODBUS, PROFIBUS and other communication protocol.
<b>C401.5</b>	Students are able to understand the industrial Ethernet and wireless communication.

**COURSE NAME: EI6702 LOGIC AND DISTRIBUTED CONTROL SYSTEM  
(IV Year –VII Semester) CODE COURSE: C402**

<b>C402.1</b>	To understand about Programmable Logic Controller (PLC) and their programming languages.
<b>C402.2</b>	To understand about the applications of PLC.
<b>C402.3</b>	To understand about Computer Controlled Systems.
<b>C402.4</b>	To have the knowledge on the architecture and local control unit of Distributed Control System (DCS).
<b>C402.5</b>	To understand the information with respect to interfaces used in DCS.



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**COURSE NAME: IC6701 DIGITAL CONTROL SYSTEM**  
**(IV Year –VII Semester) CODE COURSE: C403**

<b>C403.1</b>	Able to apply Z-transform to Discrete control Systems
<b>C403.2</b>	Apply reduction techniques and SFR to Digital control SISO and MIMO to derive PTF
<b>C403.3</b>	Perform Stability analysis of Discrete control Systems
<b>C403.4</b>	Design Digital PID Controllers and compensators for digital control Systems
<b>C403.5</b>	Apply State space analysis to sampled data Control Systems

**COURSE NAME:EE6007 –Micro electro mechanical systems**

**(IV Year –VII Semester) CODE COURSE: C404**

<b>C404.1</b>	<ul style="list-style-type: none"><li>To understand the operation of micro devices, micro systems and their applications.</li></ul>
<b>C404.2</b>	<ul style="list-style-type: none"><li><i>To design the micro devices, micro systems using the MEMS fabrication process</i></li></ul>
<b>C404.3</b>	<ul style="list-style-type: none"><li>Ability to understand the functions of sensors and Actuators</li></ul>
<b>C404.4</b>	<ul style="list-style-type: none"><li>To understand various process involved in MEMS fabrication process</li></ul>
<b>C404.5</b>	<ul style="list-style-type: none"><li>Ability to understand various material used in MEMS.</li></ul>





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**COURSE NAME: EI6704 BIOMEDICAL INSTRUMENTATION**  
**(IV Year –VII Semester)**

**CODE COURSE: C405**

<b>C405.1</b>	Students will be able to understand the fundamentals of Biomedical Engineering.
<b>C405.2</b>	Students will be able to understand the measurement of certain important electrical and non-electrical parameters.
<b>C405.3</b>	Students will be able to understand about the acquisition and analysis of electrical parameters.
<b>C405.4</b>	Students will be able to understand the basic principles of different imaging techniques.
<b>C405.5</b>	Students will be able to understand about life assisting, therapeutic and robotic devices.

**COURSE NAME: EE6006 Applied Soft Computing**  
**(IV Year –VII Semester)**

**CODE COURSE: C406**

<b>C406.1</b>	Students are able to understand the concepts of feed forward neural networks
<b>C406.2</b>	Students are able to understand about feedback networks and the applications of neural controller.
<b>C406.3</b>	Students are able to understand about fuzzy and neuro-fuzzy systems
<b>C406.4</b>	Students are able to understand the concepts of fuzzy logic control to real time systems
<b>C406.5</b>	Students are able to understand the concepts of genetic algorithms and its application.



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**COURSE NAME: IC6711 ADVANCED CONTROL SYSTEM Laboratory**

**(IV Year –VII Semester)**

**CODE COURSE: C407**

<b>C407.1</b>	To do Simulation of first order and second order system with and without dead time using discretization method and Runge – Kutta method
<b>C407.2</b>	To Design Discrete P+I+D controller and Deadbeat controller for a first order system
<b>C407.3</b>	To do Simulation of complex control systems using matlab/other equivalent software package.
<b>C407.4</b>	To Design Logic gates operations, Timing Operations, counter operations and math operations using PLC.
<b>C407.5</b>	To Control a given process using Real Time Embedded controller

**COURSE NAME: EI6711 Instrumentation System Design Laboratory**

**(IV Year –VII Semester)**

**CODE COURSE: C408**

<b>C408.1</b>	Design Instrumentation amplifier and active filters.
<b>C408.2</b>	Design regulated power supply ,V/I and I/V converters.
<b>C408.3</b>	Design of linearizing circuits and cold – junction compensation circuit for thermocouples.
<b>C408.4</b>	Design signal conditioning circuit for strain gauge ,RTD and to design orifice plate,rotameter.
<b>C408.5</b>	Design a PID controller , Control Valve and Study the flow lift Characteristics



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**COURSE NAME: EI6712 Comprehension**

**(IV Year –VII Semester)**

**CODE COURSE: C409**

<b>C409.1</b>	Students will be able to understand the basics of engineering science.
<b>C409.2</b>	Students will be able to understand the basics principles and operations of engineering science.
<b>C409.3</b>	Students will be able to understand the knowledge acquired from the first Semester to Sixth Semester of B.E Degree Course through periodic exercise.
<b>C409.4</b>	Students will have the Ability to review the present technological developments .
<b>C409.5</b>	Students will have the Ability to prepare the present technological developments .

**COURSE NAME: MG6851 Principles of Management**

**(IV Year –VIII Semester)**

**CODE COURSE: C410**

<b>C410.1</b>	Students will have clear understanding of managerial functions like planning.
<b>C410.2</b>	Students will have clear understanding of managerial functions like organising.
<b>C410.3</b>	Students will have clear understanding of managerial functions like staffing.
<b>C410.4</b>	Students will have clear understanding of managerial functions like leading.
<b>C410.5</b>	Students will have clear understanding of managerial functions like controlling.



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**COURSE NAME: EI6801 Computer Control of Processes**  
**(IV Year –VIII Semester)**

**CODE COURSE: C411**

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**(IV Year –VIII Semester)**

**CODE COURSE: C412**

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**COURSE NAME: EI6811 Project Work**  
**(IV Year –VIII Semester)**

**CODE COURSE: C413**

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## Department of Information Technology

**SEMESTER : VII**

**Subject Code : IT6004**

**Subject Name : SOFTWARE TESTING**

Course outcomes	
CO1	Understand about the Software Testing Principles and Defect Classes
CO2	Design of Test Cases for White Box and Black Box Testing
CO3	Analyse the various levels and types of Testing
CO4	Understand the test management and test automation techniques
CO5	Understand about the test metrics and measurements

**Subject Code : IT6702**

**Subject Name : DATA WAREHOUSING AND  
DATA MINING**

Course outcomes	
CO1	Understand the concepts of data warehousing and data mining techniques.
CO2	Apply the data warehousing concepts and data mining techniques to large data sets.
CO3	Design and analyze the data and data mining functionalities.
CO4	Apply and evaluate the association rule mining and compare the various classifying algorithms.
CO5	Compare and contrast various clustering techniques and the trends in data mining.

**Subject Code : IT6701**

**Subject Name : INFORMATION MANAGEMENT**

Course outcomes	
CO1	Understand the basics of Managing the information, Relational Database Concepts & Modelling
CO2	Evaluating the network credentials & analyzing the privacy laws.
CO3	Design & implement a complex information system that meets regularity requirements



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CO4	Understand the Overview of Information Architecture & to manage an organization key master data entities.
CO5	Create and maintain Data warehouse with application oriented using Hadoop Framework.

**Subject Code : CS6703****Subject Name : GRID AND CLOUD COMPUTING**

Course outcomes	
CO1	To acquire fundamental knowledge in Distributed Computing, SOA, Grind and Cloud Computing.
CO2	To understand how Grid computing helps in solving large scale scientific problems
CO3	To Gain knowledge on the concept of virtualization that is fundamental to cloud computing.
CO4	To apply Grid and Cloud toolkits to solve real world problem
CO5	To understand security issues in Grid and Cloud Environment

**Subject Code : CS6701 Subject Name : CRYPTOGRAPHY AND NETWORK SECURITY**

Course outcomes	
CO1	Understand the concepts of Network Security and Remember the various mathematical techniques applied in Cryptography
CO2	Apply the Symmetric and Asymmetric Cryptographic methods and design Secure Applications to operate Digital Signature in Real World Situation.
CO3	Analyze the Security Architecture and the authentication requirements to identify the vulnerability of the Internet systems in designing the firewalls for E-commerce
CO4	Evaluate the Authentication Applications with different system security tools and recognize the mechanisms of the attacks, and apply them to design and evaluate
CO5	Create secured coding in design principles and identify various intrusion detection systems to achieve highest system security.





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**Subject Code : IT6712**

**Subject Name : SECURITY LABAROTORY**

Course outcomes	
CO1	Execute the various cipher techniques
CO2	Develop the various security algorithms
CO3	Use different open source tools for network security and analysis

**Subject Code : IT6711**

**Subject Name : DATA MINING LABAROTORY**

Course outcomes	
CO1	Understand tools and techniques used for Knowledge Discovery in Datawarehouses.
CO2	Apply data mining techniques and methods to large data sets.
CO3	Compare and contrast the various classifiers.
CO4	Develop text mining concepts over any commercial application
CO5	Apply various data mining algorithms on tools like R, Weka.

**Subject Code : IT6713**  
**COMPUTING LAB**

**Subject Name : GRID AND CLOUD**

Course outcomes	
CO1	Be exposed to tool kits for grid environment.
CO2	Be exposed to tool kits for cloud environment.
CO3	Be familiar with developing web services/Applications in grid framework
CO4	Learn to run virtual machines of different configuration.
CO5	Learn to use Hadoop



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## SEMESTER : VIII

Subject Code : MG6088      Subject Name : SOFTWARE PROJECT MANAGEMENT

Course outcomes	
CO1	Understand the need for Software Project management and control
CO2	Understand the different Life Cycle Models and Effort Estimation
CO3	Design the Network Planning Models(PERT and CPM)
CO4	Understand Cost Monitoring and Contract Management
CO5	Summarize organizational behaviors and people management

Subject Code : CS6004

Subject Name :CYBER FORENSICS

Course outcomes	
CO1	Discuss the security issues in network layer and transport layer.
CO2	Able to design firewalls and handle security features in E-mail.
CO3	Understood about the introduction about computer forensics.
CO4	Learn various forensics tools and evidence collection.
CO5	Analyze and validate the forensic data.

Subject Code : IT6801

Subject Name :SERVICE ORIENTED ARCHITECTURE

Course outcomes	
CO1	To understand the basic concepts of service orientation,comparison with traditional architecture
CO2	To learn service oriented analysis techniques
CO3	To learn technology underlying the service design
CO4	To learn technology underlying SOA application design using J2EE and .NET
CO5	To learn about WS Specifications

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## Department of Mechanical

COURS E CODE	ME6701	COURS E NAME	POWER PLANT ENGINEERING	SEM	7
On completion of the course, the students will be able to					
C 401.1	Know the fundamentals of coal based thermal power plant and its sub systems, and identify the various elements and functions of auxiliary systems				
C 401.2	Remember the basics of diesel, gas turbines and combined cycle power plants				
C 401.3	Understand the basics of nuclear physics and principles of nuclear power plant				
C 401.4	Know different renewable sources of energy viz. Hydro, tidal, solar et al.				
C 401.5	Evaluate the economics of power plants and to determine the performance of power plants for the various load conditions				

COURS E CODE	ME6702	COURS E NAME	MECHATRONICS	SEM	7
On completion of the course, the students will be able to					
C 402.1	Understand the basic concepts of mechatronics, sensors, their characteristics and their role in various engineering applications.				
C 402.2	Knowledge of microcontroller and microprocessor based on standard architecture and block diagrams.				
C 402.3	Ability to understand various interfacing devices and techniques with respect to real time applications.				
C 402.4	Knowledge of Programmable Logic Controllers (PLCs) for different applications and ability to program using Relays, Timers, Counters and Registers.				



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**C 402.5**

Knowledge on principles of actuators, drives and their design concepts, along with mechatronics design and case studies.

COURS E CODE	ME6703	COURS E NAME	COMPUTER INTEGRATED MANUFACTURING SYSTEMS	SEM	7
On completion of the course, the students will be able to					
<b>C 403.1</b>	Understand various production types, levels of automation, Lean Manufacturing and Just- in-Time techniques and to solve manufacturing problems				
<b>C 403.2</b>	Analyze process planning concepts with logical steps, inventory, aggregate production, material requirement planning, manufacturing resources and ERP				
<b>C 403.3</b>	Gain knowledge on group technology and cellular manufacturing systems and their impact in manufacturing areas				
<b>C 403.4</b>	Learn components, advantages and applications of flexible manufacturing systems and to solve bottle necking problems				
<b>C 403.5</b>	Learn the classification of robots, control systems, programming and various terminologies of sensors				

COURS E CODE	GE6757	COURS E NAME	TOTAL QUALITY MANAGEMENT	SEM	7
On completion of the course, the students will be able to					
<b>C 404.1</b>	Develop an understanding on quality management philosophies and frameworks. Define the dimensions of product and service quality. Understand customer focus, orientation, satisfaction, complaints and retention.				
<b>C 404.2</b>	Develop in-depth knowledge on various principles of Total quality management. Understand Quality councils, Employee involvement and continuous process improvement.				
<b>C 404.3</b>	Understand on various Traditional and New management tools and techniques for quality management. Learn the Six sigma, Bench marking and FMEA tools.				



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<b>C 404.4</b>	Understand various tools and techniques for quality management like control charts, Quality Function Development, Taguchi quality loss function.
<b>C 404.5</b>	Understand Quality systems of ISO 9000 and ISO 14000 quality standards and its implementation in manufacturing and service sectors.

<b>COURS E CODE</b>	<b>ME6005</b>	<b>COURS E NAME</b>	<b>PROCESS PLANNING AND COST ESTIMATION</b>	<b>SEM</b>	<b>7</b>
On completion of the course, the students will be able to					
<b>C 405.1</b>	Understand the different production processes, drawing interpretation and material selection.				
<b>C 405.2</b>	Calculate the various process parameters in selecting proper jigs and fixtures along with tooling and equipment.				
<b>C 405.3</b>	Estimate the material cost, labour cost, overhead and depreciation for manufacturing a product in industry.				
<b>C 405.4</b>	Calculate the production cost such as forging, welding, foundry and other shop cost.				
<b>C 405.5</b>	Calculate the machining time depending upon the machining process like threading, knurling, drilling, shaping etc.				

<b>COURS E CODE</b>	<b>ME6010</b>	<b>COURS E NAME</b>	<b>ROBOTIC S</b>	<b>SEM</b>	<b>7</b>
On completion of the course, the students will be able to					
<b>C 406.1</b>	Obtain a sound knowledge in fundamentals in the context of robot configurations, motion, anatomy and application.				
<b>C 406.2</b>	Know about a wide range of drive system, grippers and end effectors for complex industrial and societal needs.				



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<b>C 406.3</b>	Identify the requirements and application of sensors and image processing techniques in context with controlling, decision making and promotion of artificial intelligence.
<b>C 406.4</b>	Perform various kinematic and dynamic analysis for complex arm design consideration and program for various automation related needs.
<b>C 406.5</b>	Analyze robots requirements in industry considering safety, economics and maintenance

<b>COURS E CODE</b>	<b>ME6711</b>	<b>COURS E NAME</b>	<b>SIMULATION AND ANALYSIS LABORATORY</b>	<b>SEM</b>	<b>7</b>
On completion of the course, the students will be able to					
<b>C 407.1</b>	Model 2D and 3D components using analysing softwares				
<b>C 407.2</b>	Evaluate and optimize the drawing models with mathematical modelling techniques				
<b>C 407.3</b>	Import and export the drawing models within the workstations				

<b>COURS E CODE</b>	<b>ME6712</b>	<b>COURS E NAME</b>	<b>MECHATRONICS LABORATORY</b>	<b>SEM</b>	<b>7</b>
On completion of the course, the students will be able to					
<b>C 408.1</b>	Apply the method of programming in microprocessor and PLC based mechatronics systems.				
<b>C 408.2</b>	Design, simulate and analyse the basic electrical, hydraulic and pneumatic systems with the help of simulation software.				
<b>C 408.3</b>	Design mechatronics systems with microprocessor, PLC and other electrical and electronics controls.				





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COURS E CODE	ME6713	COURS E NAME	COMPREHENSION	SEM	7
On completion of the course, the students will be able to					
C 409.1	Understand the fundamentals of engineering knowledge by regular practice of solving multiple choice Questions based on various core engineering subjects.				
C 409.2	Identify the problem and formulate the steps to finding the solutions through Group Discussion.				
C 409.3	Utilize the knowledge acquired from last three years to solve complex engineering problems and which they can apply to design and development of final year projects				

COURS E CODE	MG6863	COURS E NAME	ENGINEERING ECONOMICS	SEM	8
On completion of the course, the students will be able to					
C 410.1	Explain the fundamental concepts of economics, elements of cost as applicable to engineering and carry out elementary economics analysis.				
C 410.2	Classify values, functions and apply value engineering for critical activity or product with due consideration to enhance productivity and profit.				
C 410.3	Apply various interest formulae to evaluate different alternatives and select the best suited alternative.				
C 410.4	Explain, make and justify equipment replacement decisions in accordance with industrial practices.				
C 410.5	Prepare depreciation schedule based on various depreciation methods. Also evaluate public alternatives based on their merits.				





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COURSE CODE	IE6005	COURSE NAME	PRODUCTION PLANNING AND CONTROL	SEM	8
On completion of the course, the students will be able to					
C 411.1	Know the fundamentals of production planning and production control and also perform the Break-Even Analysis				
C 411.2	Apply the work-study procedure and its methods to improve the productivity				
C 411.3	Employ Value analysis procedure to improve product functionality and also able to prepare more effective process plan				
C 411.4	Solve problems related to production scheduling and implement effective production control				
C 411.5	Carry out various analysis to calculate optimum inventory levels and reduce unnecessary activities and spending				

COURSE CODE	ME6016	COURSE NAME	ADVANCED I.C. ENGINES	SEM	8
On completion of the course, the students will be able to					
C 412.1	Acquire the knowledge on principle and operations of S.I.engines and combustion processes.				
C 412.2	Describe the concepts of charge preparation and combustion processes in C.I.engine and learn the concept of turbo charging in C.I.engine.				
C 412.3	Illustrate the concept of engine emission and norms and its treatment techniques.				
C 412.4	Identify different methods of producing alternate fuels and its suitability to I.C.engines.				
C 412.5	Develop and upgrade the knowledge on recent advances in I.C engine to increase its performance and to reduce the harmful emissions.				



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Sai Leo Nagar, West Tambaram, Chennai - 600 044. [www.sairam.edu.in](http://www.sairam.edu.in)



COURS E CODE	ME6811	COURS E NAME	PROJECT WORK	SEM	8
On completion of the course, the students will be able to					
C 413.1	Comprehend an industrial or real life problem and identify right/ real issue with solution.				
C 413.2	Complete the necessary studies and review the literature, design a setup of equipment, complete the analysis				
C 413.3	Write a project report based on the findings.				



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## DEPARTEMENT OF PRODUCTION ENGINEERING

### COURSE OUTCOMES (CO) – R-2013

#### ODD SEMESTER- VII semester

##### **GE6757 Total Quality Management**

**CO1:**The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

**CO2:**To realize the importance of significance of quality.

**CO3:**Manage quality improvement teams.

**CO4:**Identify requirements of quality improvement programs.

**CO5:**To have exposure to challenges in Quality Improvement Programs.

##### **ME6702 Mechatronics**

**CO1:**Upon completion of this course, the Students can able to design mechatronics system with the help of Microprocessor, PLC and other electrical and Electronics Circuits.

**CO2:**Student will understand the concept of key elements of mechatronics system.

**CO3:**Ability the representation of mechatronics system into block diagram & concept of transfer function, reduction and a0lysis.

**CO4:**Student will understand Principle of Sensors, its characteristics & identification of Interfacing of Sensors /Actuators to DAQ micro-controller.

**CO5:**An ability to understanding of PLC Programming & implement in real life system.

**CO6:**Student will understand the concept of modeling & A0lysis of mechatronics system.



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## **PR6701 Finite Element Analysis in Manufacturing Engineering**

**CO1:**Develop element stiffness matrix equation from spring elements.

**CO2:**Assemble element matrix equation in to a global matrix.

**CO3:**Enforce boundary condition and forces on the system.

**CO4:**Solve the resulting system and interpret result.

**CO5:**Develop the concept of local, global coordinate system and their transformation.

## **ME6010 Robotics**

**CO1:**Upon completion of this course, the students can able to apply the basic engineering knowledge for the design of robotics.

**CO2:**Classify and characterize the robots based on the configuration and work volume.

**CO3:** Explain and solve the problems related to robot design and control.

**CO4:** Illustrate the working of the transmission system in a robot.

**CO5:**Discuss the concept of vision system and image processing.

**CO6:**Write programs for automatic functioning of a robot.

## **Elective III**

### **PR6006 NON DESTRUCTIVE TESTING METHODS**

**CO1:**The students will be able to explain the fundamental concepts of NDT and Optical aids.

**CO2:**Discuss the concepts of LPT and MPT.

**CO3:**Explain the concepts of ECT and AET.



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**CO4:** Discuss the concepts of Ultrasonic testing.

**CO5:** Explain the concepts of radiography and comparison and selection of various NDT methods.

## Elective IV

### MG6097 ENGINEERING ECONOMICS AND FINANCIAL MANAGEMENT

**CO1:** Upon successful completion of this course, students will get the ability to prepare and interpret financial statements, manage funds efficiently and fix and revise prices as warranted.

**CO2:** Evaluate the economic theories, cost concepts and pricing policies.

**CO3:** Understand the market structures and integration concepts.

**CO4:** Understand the measures of national income, the functions of banks and concepts of globalization.

**CO5:** Apply the concepts of financial management for project appraisal

**CO6:** Understand accounting systems and analyze financial statements using ratio analysis.

### COURSE OUTCOMES (CO) – R-2013

### EVEN SEMESTER – VIII SEMESTER

#### ME6005 Process Planning and Cost Estimation

**CO1:** Upon completion of this course, the students can able to use the concepts of process planning and cost estimation for various products.

**CO2:** Understand different concepts regarding Organization and Productivity in industries.



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- CO3:** Manage and implement different concepts involved in work and method study and understanding of work contents in different situations.
- CO4:** Undertake small case study based project works regarding work measurement and time study.
- CO5:** Planning and controlling of production system and use of modern forecasting and management techniques for different types of industries.
- CO6:** Undertake project work for facility design based on course content.

## Elective – V

### GE6075 PROFESSIONAL ETHICS IN ENGINEERING

- CO1:** Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society
- CO2:** The students will understand the basic perception of profession, professional ethics, various moral & social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
- CO3:** The students will aware of professional rights and responsibilities of an engineer, responsibilities of an engineer for safety and risk benefit analysis.
- CO4:** The students will acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives.
- CO5:** To have an adequate knowledge about MNC's, Business, Environmental, Computer Ethics, Honesty, Moral Leadership, sample Code of Conduct.