Haldia Institute of Technology, West Bengal
(An Autonomous Institution under Maulana Abul Kalam Azad University of Technology.)
1st Year Curriculum Structure for B. Tech courses in Engineering & Technology

Paper Name: Mathematics-I	**Category: Basic Science Course**
Paper Code: BS-M101	**Semester: First**
L-T-P: 3-1-0	**Credit: 4**

Course Outcomes (COs)

CO1. To provide students with skills in algebra and calculus which would enable them to devise engineering solutions for given situations they may encounter in their profession.
CO2. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice by enhancing the power of knowledge and imagination
CO3. Prepare students for realization of journal papers outcomes, and expose them to the world of research. Illustrate the current research works and publications of the subjects in different fields adopted by the students as per course curriculum in various journals and literature.
CO4. To explore and enhance research potential explain how the ideas those are adopted can be implemented through projects and demonstrate various models, recent project proposals executing the knowledge adopted from the course.
CO5. An ability to function on multi-disciplinary teams. Lighten on the latest and modern developments in the fields.
CO6. Explain about ethical awareness and impact in the field of environmental, social and safety of the finished products. Describe the pollution, legal aspects and impacts may arise in large scale production.

Paper Name: Mathematics-II	**Category: Basic Science Course**
Paper Code: BS-M201	**Semester: Second**
L-T-P: 3-1-0	**Credit: 4**

Course Outcomes(COs)

CO1. Recall the earlier mathematical thoughts, such as idea of derivative, integration, ordinary differential equations and complex algebra.

CO2. Exhibit the idea of ordinary differential equation of first and higher order. Recognize the concept of graph theory and Laplace transform and complex variable.
CO3. Apply the knowledge of Laplace transform to reduce the complexity of differential equation. Use different graphical algorithm to find optimal solutions.

CO4. Analyze the ideas of mentioned mathematical tools so that it can be implemented to real time engineering problems

CO5. Justify and make gradation of above mentioned mathematical tools and determine the right approach to solve multidisciplinary engineering problems.
CO6. Build up logical and analytical skills to create a new idea appreciated by academics, research & emerging trends in industry.

Paper Name: Physics –I	**Category: Basic Science Course**
Paper Code: BS-PH 101 / BS-PH 201	**Semester: First / Second**

L-T-P: 3-1-0	**Credit: 4**

Course Outcomes(COs)

CO1. Describe how different electronic tools, various parameters & variables of fundamental physics related to the programme. To overcome & eliminate different constraints those may arises by solving the physical and numerical problems.

CO2. Overall enhancement of innovative problems solving ability by enhancing the power of knowledge and imagination.

CO3. Describe the current research works and publications of the subjects in different fields adopted by the students as per course curriculum in various journals and literature.

CO4. Describe how the ideas those are adopted can be implemented through projects and demonstrate various models, recent project proposals to execute the knowledge adopted from the course.

CO5. Define how the ideas can be share with the multi - disciplinary personals. Lighten on the latest and modern developments in the fields.

CO6. Explain about ethical awareness and impact in the field of environmental, social and safety of the finished products. Describe the pollution, legal aspects and impacts may arise in large scale production.

Paper Name: Chemistry-I	**Category: Basic Science Course**
Paper Code: BS-CH-101 / BS-CH-201	**Semester: First / Second**
L-T-P: 3-1-0	**Credit: 4**

Course Outcomes(COs)

CO1. To memorize the elementary topics of chemistry such as chemical thermodynamics, atomic structures, electromagnetic spectroscopy, corrosion chemistry, electrochemistry, organic reactions and synthesis of drug molecules.

CO2. To acquire knowledge on the fundamental concepts of chemical thermodynamics, atomic structures, electromagnetic spectroscopy, corrosion chemistry, electrochemistry, organic reactions, polymers and synthesis of drug molecules.

CO3. Making use of concepts of drug molecules, polymer chemistry, corrosion chemistry and battery technology to meet day to day necessities including application of the organic synthesis, Maxwell's equations, spontaneity and equilibrium reactions etc.

CO4. analyse versatileand novel problems and sorting them out,covering all the topics of the entire course.

CO5. rationalize, explain and corroborate several chemical problems, determine the most plausible approach of solving real life interdisciplinary chemical complications.

CO6. To construct apurposeful and efficient model through which learners can be able to develop and solve trivial as well as up to date problems recognized by academia, researchers and industries.

Paper Name: Programming for Problem Solving	**Category: Engineering Science Course**
Paper Code: ES-CS-101/ES-CS -201	**Semester: First / Second**
L-T-P: 3-1-0	**Credit: 4**

Course Outcomes (COs)

CO1. To formulate simple algorithms for arithmetic and logical problems.

CO2. To test and execute the programs and correct syntax and logical errors.
CO3. To implement conditional branching, iteration and recursion.
CO4. To decompose a problem into functions and synthesize a complete program using divide and conquer approach. To use arrays, pointers and structures to formulate algorithms and programs.
CO5. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
CO6. To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

Paper Name: Basic Electrical and Electronics Engineering	**Category: Engineering Science Courses**
Paper Code: ES-EE101 / ES-EE201	**Semester: First / Second**
L-T-P: 3-1-0	**Credit: 4**

Course Outcomes(COs)

CO1. To acquire knowledge of different theorems for electric and magnetic circuits analysis. Explain the working principle, construction, applications of Transformer, DC machines, AC machines. Concept of 3 phase power, JFET, MOSFET, OPAMP, sinusoidal voltages and currents in different machines and circuits. Explain fundamental laws and theorems governing the working different electrical machines and circuits. Able to identify the procedures for calculations of different circuit parameters.
CO2. Use the concepts of applying mathematics and science principles, trigonometry, complex algebra, phasor operations to provide solution of different simple problems; critical circuit problems related to electrical systems.
CO3. Analyze series circuits, flow of currents, algebraic sum of voltages (voltage drops) in any closed path in a circuit to examine the behavior of electric circuits and performance characteristics and efficiency of electrical machines.
CO4. Evaluate and judge whether the solutions obtained are correct and matches the required parameters and characteristics.
CO5. Use the knowledge acquired to investigate unknown problems and design and assemble to find a solution to the problem.

Paper Name: English Language and Technical Communication	**Category: Humanities and Social Sciences including Management course**
Paper Code: HM-HU 101/HM-HU201	**Semester: First / Second**
L-T-P: 2-0-0	**Credit: 2**

Course Outcomes(COs)

CO1. Understanding the mechanism of interpretation through language learning by practicing reading, writing and comprehension skills.
CO2. Understanding complex engineering problems by a sound grammatically correct knowledge of the English Language & honing writing, and reading skills for software research, solutions, marketing etc.
CO3. Equipping learners to solve various problems related to aptitude test through the practice of various Verbal reasoning and grammar practice.

CO4. Development of analytical thinking through practice of analytical essays, business correspondence.
CO5. Learning effective communication strategies for handling criticism and adverse remarks and also knowing strategies of effective intervention, kinesics and courtesies and different components of soft skills.
CO6. Awareness about the society, public health and safety, growth and changes in society, culture and environment through comprehension, technical report writing practice.

Paper Name: **Physics Labotary –I**	**Category: Basic Science Course**
Paper Code: (BS-PH-191 & BS-PH-291)	**Semester: First / Second**
L-T-P: 0-0-3	**Credit: 1.5**

Course Outcomes (COs)

CO1. Describe the various aspects, parameters, scales of experimental tools and design to conduct the experiments in the laboratory.
CO2. Analyze the methods of experiments and interpret the output results. Emphasis on the limitations of theoretical concepts, measuring instruments to perform the experiments and deviation of results from ideal one.
CO3. Describe the needs of publication of the outcome results and correlate the results with published papers in various journals and literature in the respective fields.
CO4. Describe how the ideas those are adopted can be implemented through projects and demonstrate various models, recent project proposals to execute the knowledge adopted from the course.
CO5. Define how the ideas can be share with the multi - disciplinary personals. Lighten on the latest and modern developments in the fields.
CO6. Explain about ethical awareness and impact in the field of environmental, social and safety of the finished products. Describe the pollution, legal aspects and impacts may arise in large scale production.

Paper Name: Chemistry Laboratory –I	**Category: Basic Science Course**
Paper Code: (BS-CH-191 & BS-CH-291)	**Semester: First / Second**
L-T-P: 0-0-3	**Credit: 1.5**

Course Outcomes(COs)

CO1. To be able to design, carry out, record and analyze the results of chemical experiments. Students will demonstrate laboratory skills and show understanding in all major laboratory techniques and principles including instrumentation, synthesis, purification, analysis including green chemistry.
CO2. To be skilled in problem solving, critical thinking and analytical reasoning. To operate a range of chemical instrumentation with adequate hands-on experiences.
CO3. To be able to use modern instrumentation and classical techniques, to design experiments and to properly record the results of their experiments.

CO4. To be able to use appropriate literature research and go through journal articles for useful information. Students will show proficiency at scientific communication including posters, presentations, laboratory reports and even journal articles.

CO5. To demonstrate creative and independent thinking in both learning and work environments. Work independently and collaborate effectively with other people in a team. Self-evaluate their own learning progress and develop motivation and learning skills for lifelong learning.

CO6. To learn the value of a professional work ethic including working as part of a diverse team. They will develop the ability to recognize ethical issues related to the impact of technological advances on society.

Paper Name: Programming for Problem Solving	**Category: Engineering Science Course**
Paper Code: ES-CS-191/ES-CS -291	**Semester: First / Second**
L-T-P: 0-0-3	**Credit:1.5**

Course Outcomes(COs)

CO1. To formulate simple algorithms for arithmetic and logical problems.
To translate the algorithms to programs (in C language).

CO2. To test and execute the programs and correct syntax and logical errors.
To implement conditional branching, iteration and recursion.

CO3. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.

CO4. To use arrays, pointers and structures to formulate algorithms and programs.

CO5. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.

CO6. To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

Paper Name: Workshop Practice	**Category: Engineering Science Course**
Paper Code: ES-ME191 / ES-ME291	**Semester: First / Second**
L-T-P: 1-0-3	**Credit: 2.5**

Course Outcomes (COs)

CO1. Define, describe and determine the types and nature of the physical parameters like cutting speed, feed, depth of cut etc applied on mechanical manufacturing systems.

CO2. Classify and explain the effects of the above physical parameters as applied on mechanical manufacturing systems for proper comprehension.

CO3. Train the students in metal joining process like welding, soldering, etc

CO4. Impart skill in fabricating simple components using sheet metal

CO5. Cultivate safety aspects in handling of tools and equipment

CO6. Develop the collective skill and potentiality and leadership quality to work in a group or team.

Paper Name: Engineering Drawing	**Category: Engineering Science Course**
Paper Code: ES-ME192 / ES-ME292	**Semester: First / Second**
L-T-P: 1-0-3	**Credit: 1.5**

Course Outcomes (COs)

CO1. To represent pictorially different elements and components using basic engineering drawing guidelines.

CO2. To gain significance of scaling pertinent to engineering drawing problems. The incumbents should also have knowledge about analytical curves and their relevance to understand different higher level mechanical engineering problems.

CO3. To understand the concept of projections for 1D, 2D and 3D object representation.

CO4. To develop an idea and ability to view complex interior sections of a solid object, and they will also be able to analyze and explain how different surfaces are generated when a solid object is cut along a plane and its surfaces are stretched out.

CO5. To draw isometric to orthographic views and vice versa.

CO6. To apply the comprehensive knowledge by using a suitable computer aided drafting package.

Paper Name: Language Laboratory	**Category: Humanities and Social Sciences including Management**
Paper Code: HM-HU 191/ HM-HU291	**Semester: First / Second**
L-T-P: 0-0-2	**Credit: 1**

Course Outcome (COs)

CO1. Improving comprehension ability in English & understanding the mechanism of interpretation though language learning.

CO2. Honing conversation skills by learning to substantiate conclusions in grammatically correct English

CO3. Honing ‘Reading Skills’ and its sub skills using Visual / Graphics/Diagrams /Chart Display/Technical/Non-Technical Passages; Learning Global / Contextual / Inferential Comprehension for technical competence.
CO4. Learning effective, real life communication skills in English through several language lab activities pertaining to the four basic skills of LSRW
CO5. Learning basic soft skills and leadership qualities
CO6. Engaging the learner in a positive and imaginative environment to hone socio-cultural, ethical and moral skills.

Paper Name: NSS	**Category: Universal Human Value**
Paper Code: XC-181	**Semester: First / Second**
L-T-P: 0-0-2	**Credit: 0**

Course Outcomes (COs)

CO1. To Create awareness for women’s education, old age education saving of girl child. Medical issue-blood donation and Thalassemia test.

CO2. To Realize, synthesize, and evaluate their personal readiness for leadership by group work, communicating effectively and to overcome & eliminate different constraints those may arises in their academic and daily life.

CO3. To Define and correlate different kind of social, cultural and ethical issue in light of saving of girl child, women education, saving of fuel. Manifest an ethics and service to the nation as a fundamental duty by organizing seminar symposia, work shop, essay writing, poster presentation etc.

CO4. To Apply problem solving skills by taking on volunteer and community service in their professional and social life and show interest to think about eco-friendly projects for the betterment of the society.

CO5. To Recognize the importance of civic engagement and community activism through volunteerism, community and campus service, team projects.

CO6. To Realizing his/her importance and duty, feel interest about ethical awareness and impact in the field of environmental, social and safety of the finished products.

Haldia Institute of Technology
Department of Applied electronics and Instrumentation Engineering

Third Semester Details Syllabus under Autonomy

Course Name: Mathematics-III (Mathematical Methods)	**Category:** Basic science Courses
Course Code: BS-M301	**Semester: 3rd**
L-T-P: 2-1-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 2 hrs./week	Continuous Assessment: 25Marks
Tutorial: 1	Attendance: 5 Marks
Total Lectures: 40	End Semester Exam.: 70 Marks
Pre-Requisites: (10+2) Mathematics	

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate the following knowledge, skills and attitudes. Student will be able to:

CO.1. Learn the concepts of the theory of Probability with the purpose of providing mathematical models of situations affected or even directed by chance effects. Solve the problems related to Probability distribution, both discrete and continuous.
CO.2. Solve the problems related to basic statistics, Correlation-Regression and curve fitting.
CO.3. Find the Fourier Series of a function by definition.
CO.4. Describing the techniques of Fourier transform and using them to transform a problem into one that can be more easily solved.
CO.5. Understand the concept of interpolation, find interpolation polynomial and compute functional values.
CO.6. Apply numerical methods to obtain approximate solutions of mathematical problems.

Course Name: Circuit Theory and Network Analysis	**Category: Professional Core**
Course Code: PC-EI 301	**Semester: 3rd**
L-T-P: 2-1-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25 Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 45	End Semester Exam.: 70 Marks
Pre-Requisites: Knowledge of matrix, KCL, KVL, Laplace Transformation (basic level) and concept of Resistance, Inductor, Capacitor.	

Course Outcomes (COs):

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

CO.1. **Remember** the basic concepts of DC and AC circuit behavior and network theorems.
CO.2. **Understand** the transient response, active filters, the fundamental concepts of network analysis and synthesis of two-port passive networks and the self-inductance, mutual inductance and coefficient of coupling using dot convention of coupled circuit.
CO.3. **Apply** the Thévenin, Norton, nodal, mesh analysis and graph theory to express complex circuits in their simpler equivalent forms.
CO.4. **Analyze** transient response of RL, RC, and RLC circuits and resonant circuits in time and frequency domains.
CO.5. **Compare** the different network solving techniques and solve the complex network problems by applying suitable method.
CO.6. **Design** and **characterize** the active filters.

Course Name: Sensors and Transducers	**Category:** Professional Core
Course Code: PC-EI 302	**Semester: 3rd**
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 40	End Semester Exam.: 70 Marks
Pre-Requisites: To understand this course, the learner must have idea of elementary physics and mathematics, Basic Electrical Engineering.	

Course Outcomes (COs):

After completing the course the student should be able to

CO.1. **Understand** the function of sensors and transducers inmeasurement systems and **define** various performance characteristics of measurement system.

CO.2. **State and explain** the working principle of various types of sensors and transducers i.e. Mechanical, Electromechanical, Resistive, Inductive, Capacitive, Piezoelectric, Thermal, Magnetic etc.

CO.3. **Choose** a suitable sensor/transducer for a particular industrial application.

CO.4. **Differentiate** various sensors/transducers based on their utility for a particular application.

CO.5. **Develop** the skill to **identify and analyze** the complex technical problems and also capable to give a socio-economic solution to that problem**.**

CO.6. **Design** simple sensing/transduction system for a small industrial application.

Course Name: Analog Integrated Circuits	**Category: Professional Core Course**
Course Code: PC-EI303	**Semester: 3rd**
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: 1 hr/week	Attendance: 5 Marks
Total Lectures:45	End Semester Exam.: 70 Marks
Pre-Requisites: No-prerequisite	

Course Outcomes (COs):

CO.1. To **understand** various semiconductor devices and subsequently different biasing arrangement in transistor circuits and also the calculation of operating point or Q-point in different biasing circuits.

CO.2. To **acquire** extensive knowledge and perception of h-model and high frequency model of transistors.

CO.3. To **study** the concepts of both positive and negative feedback in electronic circuits and feedback oscillators

CO.4. To **explore** the theoretical & circuitry details of the design of an Op-amp, which is the backbone for the basics of Linear integrated circuits.

CO.5. To realize the functional block diagram of NE565/NE566 and an application of IC555 timer as monostable and astable multivibrators.

CO.6. To **learn** design guide lines of power supply after understanding series and shunt voltage regulator, 78xx and 79xx series.

Course Name: Digital Electronic Circuits	**Category: Professional Core Courses**
Course Code: PC EI 304	**Semester: 3RD**
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 45	End Semester Exam.: 70 Marks
Pre-Requisites: Basic Electronics Engineering	

Course Outcomes (COs):

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

CO.1. **Apply** different type of codes and number systems which are used in digital computing and communication systems.

CO.2. **Develop** different types Logic circuit simplification using various mapping and mathematical methods.

CO.3. **Analyze, design and implement** combinational including arithmetic logic circuits.

CO.4. **Analyze, design and implement** sequential logic circuits.

CO.5. **Built** the fundamental knowledge and analyze the operation of various A/D and D/A converters.

CO.6. **Identify** various types of memory elements, PLDs, digital logic families and apply the knowledge in different types of digital circuits for real world application.

Course Name : Environmental Science	**Category: Mandatory Courses**

Course Code : MC-ES301	**Semester: 3rd**
L-T-P: 2-0-0	**Credit: 0**
Teaching Scheme	**Examination Scheme**
Theory: 2 hrs./week	Continuous Assessment: 25
Tutorial: Nil	Attendance: 5
Total Lectures: 30	End Semester Exam: 70
Pre-Requisites: No-prerequisite	

Course Outcome:

CO.1. Understand the components of natural environment, its relationships with human activities and also analyze human impacts on the environment.

CO.2. Understand key current environmental problems as well as be conversant with basic environmental legislation.

CO.3. Identify and value the effect of the pollutants on the environment: atmosphere (air and noise), water and soil.

CO.4. Analyze the mathematical principles for successful solution of practical environmental engineering problems which in turn helps to solve any environmental issue arose during core industrial process or final uncontrolled as well as unplanned discharge.

CO.5. Analyze an industrial activity and identify the environmental problems related to that activity as well as apply the basics of an Environmental Management System (EMS) to a core industrial activity.

CO.6. Plan strategies to monitor different types of pollution along with selection of the most appropriate technique to purify, reduce and/or control the emission of pollutants.

Name of the Course: Numerical Methods Lab	**Category:**
Course Code: BS-M 391	**Semester:3rd**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination scheme: Maximum marks:**
Tutorial: Nil	External Assessment:60
Practical: 2 hrs./week	Internal Assessment:40
Credit Points: 1	

Course Outcomes:	
CO. 1	To solve problems with Newton forward /backward, Lagrange's interpolation.
CO. 2	To solve problems of numerical integration using Trapezoidal rule, Simpson's 1/3 rule, Weddle's rule
CO. 3	To find numerical solution of a system of linear equations using Gauss elimination and Gauss-Seidel iterations.
CO. 4	To find numerical solution of Algebraic Equation by Regula-Falsi and Newton Raphson methods.
CO. 5	To Find the numerical solution to ordinary differential equation by Euler's and Runga-Kutta methods.
CO. 6	Use Software packages like MATLAB, SCILAB, LABVIEW, PYTHON, MATHEMATICA to solve numerical problems

Name of the Course: Circuit Theory Lab	**Category: Professional Core**
Course Code: PC-EI 391	**Semester:3rd**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination scheme:**
Tutorial: Nil	External Assessment:60
Practical: 3 hrs./week	Internal Assessment:40
Credit Points:1.5	

Course Outcomes: *At the end of the course, a student will be able to:*	
CO. 1	To understand basic concepts of DC and AC circuit behavior.
CO. 2	To apply the concepts of circuit laws for analysis of different circuit performance and determination of different circuit parameters.
CO. 3	To understand the requirement of frequency response of any practical circuit.
CO. 4	To develop the software skill for analyzing different transformation tool and design of electrical circuit based simulations.
CO. 5	To measure and record the experimental data, analyze the results, and prepare a technical laboratory report.
CO. 6	To design circuits with appropriate instruments and safety precautions.

Name of the Course: Sensors and Transducers Lab	**Category:** Professional Core
Course Code: PC-EI 392	**Semester:** 3rd
Duration: 6 months	**Maximum Marks:** 100
Teaching Scheme	**Examination scheme:**
Tutorial: Nil	External Assessment:60
Practical: 2 hrs./week	Internal Assessment:40
Credit Points: 1.5	

Course Outcomes: At the end of the course, learner will be able to	
CO. 1	Identify different types of sensors & transducers which are used for temperature, speed, torque, displacement, light intensity measurement in industry as well as home appliances.
CO. 2	Demonstrate the operations of different sensors and transducers based measurement systems.
CO. 3	Select the appropriate sensor depending on application criteria.
CO. 4	Characterize different types of sensors and draw the related curves.
CO. 5	Understand the safety and maintenance issues related to different sensor based systems.
CO. 6	Function effectively as an individual and as a member in teams at the time of executing laboratory experiments.

Name of the Course: Analog Circuits Design Lab	**Category:** Professional Core Course
Course Code: PC-EI393	**Semester:** 3rd
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination scheme:**
Tutorial: Nil	External Assessment:60
Practical: 3 hrs./week	Internal Assessment:40
Credit Points: 1.5	

Course Outcomes:	
CO. 1	Set up standard experimental methods and select proper instruments to evaluate performance characteristics of different electronic circuits
CO. 2	Determine experimental procedures for different types of electronic circuits.
CO. 3	Evaluate possible reasons of inconsistency between experimental observations and theoretical values and interpret the experimental data.
CO. 4	Investigate different types of instruments connections keeping in mind technical, economical, safety issues.
CO. 5	Analyze graphical presentations of experimental data and solve different complex technical problems.
CO. 6	Design mini electronic based systems.

Course Name: Digital Electronics Lab	**Category:** Professional Core
Course Code: PC-EI 394	**Semester:** 3rd
Duration: 6 months	**Maximum Marks:** 100
Teaching Scheme	**Examination scheme:**
Tutorial: Nil	External Assessment:60
Practical: 3 hrs./week	Internal Assessment:40
Credit Points: 1.5	

Course Outcomes:	
CO. 1	Have a thorough **understanding** of the fundamental concepts and techniques used in digital electronics.
CO. 2	To **understand and examine** the structure of various number systems and its application in digital design.
CO. 3	The ability to **understand, design and analyze** various combinational and sequential circuits
CO. 4	**Develop** competence in Combinational and Sequential Logic Problem formulation and Logic Optimization
CO. 5	**Develop** skill to build, and troubleshoot digital circuits.
CO. 6	Ability to **identify** basic requirements for a design application and propose a cost effective solution.

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Fourth Semester Syllabus under Autonomy

Course Name: Electrical & Electronic Measurements	**Category:** Professional Core
Course Code: PC-EI 401	**Semester: Fourth Semester**
L-T-P: 3-1-0	**Credit:** 4
Teaching Scheme	**Examination Scheme**
Theory: 4 hrs./week	Continuous Assessment: 25Marks
Tutorial: 1 hr/week	Attendance: 5 Marks
Total Lectures:48 hours	End Semester Exam.: 70 Marks
Pre-Requisites: Basic Electrical Engineering,Basic Electronics Engineering, Circuit Theory & Networks	

Course Outcomes (COs):

PC-EI 401.1 : To **describe** the methods of measurement, errors in measurement and its classification.
PC-EI 401.2 : To **state** the principle of operation of analog indicating instrument.
PC-EI 401.3 : To **understand and apply** various technique of resistance, capacitance and inductance measurement.
PC-EI 401.4 : To **understand and analyze** the operation of Instrument Transformer and power measurement.
PC-EI 401.5 : To **illustrate** the concept of Cathode Ray Oscilloscope.
PC-EI 401.6 : To **design** the various types of Digital Instruments.

Course Name: Microprocessors & Microcontroller	**Category:** Professional Core Courses
Course Code: PC EI 402	**Semester:** 4TH
L-T-P: 3-1-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: 1 hrs./week	Attendance: 5 Marks
Total Lectures: 45	End Semester Exam.: 70 Marks
Pre-Requisites: Digital Electronics	

Course Outcomes (COs):

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

CO.7. **Describe** the architecture of Microprocessors (8085, 8086) and Microcontroller (8051).

CO.8. **State** the importance and function of different modules of Microprocessor and Microcontroller.

CO.9. **Understand and apply** the fundamental of assembly level programming of Microprocessor and Microcontroller.

CO.10. **Understand and analyze** the use of timer/counter, interrupt and serial data communication process in microcontroller.

CO.11. **Illustrate** how the peripheral (8255 etc.) and memory devices are interfaced with Microprocessor.

CO.12. **Design** different real world interfacing circuit using microprocessor and microcontroller.

Course Code: PC-EI 403	**Semester:** 4TH
L-T-P: 3-0-0	**Credit:** 3
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures:36	End Semester Exam.: 70 Marks
Pre-Requisites: Knowledge differential and integral calculas	

Course Outcomes:

At the end of the course, students will demonstrate the ability

PC-EI 403.1. To understand the basic laws ofelectromagnetism.

PC-EI 403.2. To obtain the electric and magnetic fields for simple configurations under static conditions.

PC-EI 403.3. To analyze time varying electric and magneticfields.

PC-EI 403.4. To understand Maxwell's equation in different forms and differentmedia.

PC-EI 403.5. To understand the propagation of EMwaves.

PC-EI 403.6. To impart knowledge on the concepts of Electrostatic fields, electrical potential, energy density and their applications. Magneto static fields, magnetic flux density, vector potential and its applications. Different methods of EMF generation and Maxwell's equations Electromagnetic waves and characterizingparameters

Course Name: Biology	**Category:** Professional Core Courses
Course Code: BS-BIO 401	**Semester:** 4TH
L-T-P: 3-0-0	**Credit:** 3
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25 Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam.: 70 Marks
Pre-Requisites: No-prerequisite	

Course Outcomes (COs):

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

CO.1. Understand and **explain** the biological concepts from an engineering perspective.

CO.2. Understand and **explain** the concepts of hierarchy of life forms at phenomenological level, biological sensing and its challenges.

CO.3. Understand and **explain** the concept of genetics as well as how genetic material passes from parent to offspring.

CO.4. Understand, assess and **explain** the different bio-molecules as building blocks of life, macromolecular analysis, information transfer and metabolism as well as the basic concept of microbial system.

CO.5. Explain, assess and **integrate** biological principles for developing next generation technologies.

CO.6. Understand and **explain** the development of artificial systems mimicking human action.

Course Name: Data Structure & Algorithm	**Category:** Engineering Science Course
Course Code: ES-CS 401	**Semester:** 4TH
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25 Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam.: 70 Marks
Pre-Requisites: Concept of C-Language	

Course Outcomes (COs):

Upon successful completion of this course, a student will be able to:

CO.1. Acquaint with the different properties of algorithm and recognize various types of data structure along with the relevance of their application for solving real world problems.

CO.2. Comprehend the concept of linked list along with its difference from array and its many applications for solving different problems.

CO.3. Know the concept of ADT (like stack, queue) and recognize its significance for mapping various real life problems to the programming ground to get the solutions of the corresponding problems.

CO.4. Create the concept of non-linear data structure like graph, tree and their appliance in various problems in societalissues.

CO.5. Know different traversal approaches and select proper data structure and algorithm by analyzing time complexity and space complexity for specific problems.

CO.6. Know different searching and sorting approaches and select proper data structure and algorithm by analyzing time complexity and space complexity for specific problems.

Course Name: Indian Constitution and Culture	**Category:** Mandatory Course
Course Code: MC-ES 401	**Semester:** 4TH
L-T-P: 1-0-0	**Credit: 0**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam.: 70 Marks
Pre-Requisites: No-prerequisite	

Course Outcome:

After the completion of this course learners will be able to:

MC-ES 401.1: Identify the authority to redress the problems in their profession or society.

MC-ES 401.2: Describe: The features of Indian Constitution.

MC-ES 401.3: Workings of the various Legislative, Executive and Judicial bodies in the country appreciate the democratic workings at the grassroots level.

MC-ES 401.4: Understand the jurisdiction and procedures of our courts.

Name of the Course: Electrical & Electronic	**Category: Professional Core Course**

Measurement Lab.	
Course Code: PC-EI491	**Semester:4th**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination scheme: Maximum marks:**
Tutorial: Nil	External Assessment:60
Practical: 2 hrs./week	Internal Assessment:40
Credit Points: 1.5	

Course Outcomes:	
CO. 1	Identify different analogue & digital instruments both AC and DC, source and sink devices, their specifications, constructions using basic knowledge of electrical measurement.
CO. 2	Perform the experiments, interpret measured data and compare the measured value with the true value of a quantity, calculate error in measurement, draw calibration & error curve using appropriate techniques.
CO. 3	Develop the concept of calibration and understand the limitations of the different measuring instruments.
CO. 4	Review and analyse different methods of measurement of frequency, self-inductance, Capacitance and resistance using AC and DC bridges and provide valid concluding remarks.
CO. 5	Learn the necessity of safety measures of using different instruments and handling of high voltage AC.
CO. 6	Work as a member in a team, communicate with each other, and share their independent thinking to perform the experiment successfully.

Name of the Course:Microprocessor and Microcontroller Lab	**Category:Professional Core Courses**
Course Code: PC EI 492	**Semester:4th**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination scheme: Maximum marks:**
Tutorial: Nil	External Assessment:60
Practical: 2 hrs./week	Internal Assessment:40
Credit Points: 1.5	

Course Outcomes:	
CO. 1	To construct and apply the assembly level programming of microprocessor and microcontroller.
CO. 2	To develop the programming logic and concept with the help of algorithm or flowchart.
CO. 3	To troubleshoot assembly language program along with interactions between software and hardware.
CO. 4	To practice the interfacing of microprocessor and microcontroller with peripheral devices for various applications.
CO. 5	To develop the ability to communicate effectively with fellow group members for dividing and sharing the assignments among themselves.

Name of the Course: Data Structure & Algorithm Lab	**Category:** Engineering Science Courses
Course Code: ES-CS 491	**Semester:** 4th
Duration: 6 months	**Maximum Marks:** 100

Teaching Scheme:	**Examination scheme:** Maximum marks:
Tutorial: Nil	External Assessment:60
Practical: 2 hrs./week	Internal Assessment:40
Credit Points: 1.0	

Course Outcomes:	
ES-CS 491.1.	To know the concept of linear data structure like array along with its applications for solving various mathematical problems concerned with different topics like the operations of matrices.
ES-CS 491.2.	To recognize the various types of ADT like stack & queue with their operations and also their applications in the conversion among infix, prefix & postfix notations.
ES-CS 491.3.	To comprehend the significance of recursion for solving problems like Tower of Hanoi.
ES-CS 491.4.	To be acquainted with the concept of linked list with its classification and the relevance of the usage of such concepts according to the nature of the problems.
ES-CS 491.5.	To be aware with various algorithms applied for searching and sorting purposes with the differences regarding their working principles.
ES-CS 491.6.	To understand the significance of non-linear data structures by the implementations of operations done by Binary Search Tree (BST) etc. and also find the importance of hashing in case of any searching problems.

Name of the Course: Advanced Language Lab	**Category:** Humanities and Social Sciences including management courses
Course Code: HM-HU 481	**Semester:4th**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination scheme: Maximum marks:**
Tutorial: Nil	External Assessment:60
Practical: 2 hrs./week	Internal Assessment:40
Credit Points: 1.5	

Course Outcomes:	
CO. 1	To distinguish between various contexts of human communication, e.g., one-to-one, small group, organizational, formal, informal, media, family, intercultural communication, technologically mediated communication, etc.
CO. 2	To use knowledge of interview processes in answering typical HR questions and to demonstrate proper interview etiquette.
CO. 3	To analyze a given topic, enumerate main points and deliver a structured speech with proper introduction and conclusion.
CO. 4	To utilize the key skills like active listening, managing conflict, collaborative communication, and proper body language successfully while discussing any given topic in a group.
CO. 5	To defend opinions with evidence and argument while speaking to an audience or discussing a topic in a group.
CO. 6	To employ effective presentation skills to speak about general and academic topics in front of an audience and transfer this skill successfully to higher semester seminars and future career.

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Fifth Semester Details Syllabus under Autonomy

Course Name: Control System	**Category:** Professional Core Courses
Course Code: PC EI 501	**Semester:** 5TH
L-T-P: 3-0-0	**Credit:** 3
Teaching Scheme	**Examination Scheme**
Theory:3hrs./week	**Continuous Assessment:** 25Marks
Total Lectures: 36	**Attendance:** 5 Marks
	End Semester Exam.: 70 Marks
Pre-Requisites: Engineering mathematics that teaches complex variables and Laplace transform	

Course Outcomes (COs):

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

CO.1. The modeling of different linear-time-invariant systems using transfer.
CO.2. The concept of time response and steady state error for linear-time invariant systems.
CO.3. Characterization of plants and control loops.
CO.4. The concept of stability analysis in time and frequency domain for linear-time invariant systems
CO.5. The design of compensators.
CO.6. The concept of non-linear system**.**

Course Name: Industrial Instrumentation	**Category:** Professional Core
Course Code: PC-EI 502	**Semester:** V
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures:36	End Semester Exam.: 70 Marks
Pre-Requisites: To understand this course, the learner must have idea of elementary physics, Sensor & Transducers and Basic Measurement.	

Course Outcomes (COs):

CO.1. Name different methods for pressure, temperature, flow and level measurement in industry and laboratory.
CO.2. Explain the working principle of different method of pressure, temperature, flow and levelmeasurement.
CO.3. Apply the basic knowledge of physics to explain the working principle of the measurement of pressure, temperature, flow and level.
CO.4. Differentiate characteristics of each technique of measurement for pressure, temperature, flow and level.
CO.5. Select the suitable method of pressure, temperature, flow and level measurement technique depending on industrial application.
CO.6. Comprehend the installation, calibration and application of process transmitter.

Course Name: Optical Instrumentation	**Category:** Professional Elective Courses-I
Course Code: PE-EI 501	**Semester: V**

L-T-P: 3-0-0	**Credit: 3**

Course Name: Advanced Sensors	**Category:** Professional Elective Course-I
Course Code: PE-EI 502	**Semester: 5th**
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks

Teaching Scheme	**Examination Scheme**
Theory: hrs./week	Continuous Assessment: 25 Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam.: 70 Marks
Pre-Requisites: Knowledge of basic optics, Fundamentals of Electromagnetic theory	

Course Outcome:

PE-EI 501.1: To remember the structures of Optical fiber and theirproperties.
PE-EI 501.2: To understand operation of lasers, LEDs, and Photo-detectors
PE-EI 501.3: To apply the advantages of Optical - modulators, Switch, and Amplifiers.
PE-EI 501.4: To analyze the application of Optical Fiber Sensors and Laser.
PE-EI 501.5: To evaluate the principle of Holography and applications.
PE-EI 501.6: To design case studies about Industrial Application of optical fiber and lasers.

Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam : 70 Marks
Course Name: Object Oriented Programming Language	**Category:** Open Elective Course-I
Pre-Requisites: Basic knowledge of electronics, sensor and transducers.	
Course Code: OE-EI501	**Semester: 5th**
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**

Course Outcomes (COs):

After completing the course the student should be able to

PE-EI 502.1: Explain the various principles employed in transducers.
PE-EI 502.2: Examine the methods of fabricating a sensor.
PE-EI 502.3: Apply knowledge in designing smart sensors.
PE-EI 502.4: Discuss the techniques of fabrication and application of MEMS.
PE-EI 502.5: Design environmental measurement systems using different chemical sensors.
PE-EI 502.6: Develop bio-sensors for agricultural and food processing industry.

Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam.: 70 Marks
Course Name: Database Management Systems	**Category:** Open Elective Course-I
Course Code: OE-EI 502	**Semester:** 5th
Pre-Requisites:	
L-T-P: 3-0-0	**Credit:** 3
Teaching Scheme	**Examination Scheme**
Theory: 4 hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam.: 70 Marks

Course Outcome:

OE-EI501.1. Develop Java programs using OOP principles.
OE-EI501.2. Develop Java programs with the concepts inheritance and interfaces.
OE-EI501.3. Build Java applications using exceptions and I/O streams.
OE-EI501.4. Develop Java applications with threads and generics classes.
OE-EI501.5. Develop interactive Java programs using swings

Pre-Requisites:

Course Name: Digital Signal Processing	**Category:** Open Elective Course-II

Course Outcomes:

At the end of the course, students will demonstrate following abilities

OE-EI 502.1. The design and implementation of a database system. For a given query write relational algebra expressions for that query and optimize the developed expressions

OE-EI 502.2. For a given specification of the requirement design the databases using ER method and normalization.

OE-EI 502.3. For a given specification construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2.

OE-EI 502.4. For a given query optimize its execution using Query optimization algorithms

OE-EI 502.5. For a given transaction-processing system, determine the transaction atomicity, consistency, isolation, and durability. And implement the isolation property, including locking, time stamping based on concurrency control and serializability of scheduling.

OE-EI 502.6. Concept of the file organization along with different index structurings.

Course Code: OE-EI 503	**Semester: 5th**
L-T-P: 3-0-0	**Credit:** 3
Course Name: Soft Computing	**Category:** Open Elective Course-II
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25 Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam.: 70 Marks
Pre-Requisites: Knowledge of matrix, KCL, KVL and Laplace Transformation, Fourier Transform.	

Course Code: OE-EI-504	**Semester:** 5th
L-T-P: 3-0-0	**Credit:** 3

Course Outcomes (COs):

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

CO.1. **Describe** the distinctions between analog, continuous-time, discrete-time and digital signals, and describe the basic operations involved in analog-digital (A/D) and digital-analog (D/A) conversion, and **Understand** the concept of Sampling and reconstruction.

CO.2. **Evaluate** different type of mathematical operation on signals.

CO.3. **Compute the**

a. z-transform of a sequence, identify its region of convergence,
b. Inverse z-transform by partial fractions.
c. Fourier series and Fourier transform
d. Fast Fourier transform of discrete signal.

CO.4. **Implement** the DFT in terms of the FFT, as well as some of its applications (computation of convolution sums, spectral analysis).

CO.5. **Apply** tests (or examples and counter examples) to demonstrate linearity, time-invariance, causality and stability, and hence show whether or not a given system belongs to the important class of causal, LTI (linear time-invariant) systems.

CO.6. **Design** FIR and IIR filters with desired frequency responses.

Teaching Scheme	Examination Scheme
Theory: 4hrs /week Tutorial: Nil	Continuous Assessment: 25Marks Attendance: 5 Marks End Semester Exam.: 70 Marks
Course Name: Economics for Engineers	**Category:** Humanities & Social Sciences
Course Code: HM HU 501	**Semester: 5th**
L-T-P: 3-0-0	**Credit: 3**
Total Lectures:44	

Teaching Scheme	Examination Scheme
Theory: 4 hrs /week Tutorial: Nil	Continuous Assessment: 25Marks Attendance: 5 Marks End Semester Exam.: 70 Marks
Pre-Requisites: Familiarity with linear algebra, multivariate calculus, and probability theory Knowledge of a programming language	
Total Lectures: 45	

Course Outcomes (COs):

CO.1. Identify and describe soft computing techniques and their roles in building intelligent machines

CO.2. **Recognize** the feasibility of applying a soft computing methodology for a particular problem

CO.3. **Apply** fuzzy logic and reasoning to handle uncertainty and solve engineering problems

CO.4. **Apply** genetic algorithms to combinatorial optimization problems

CO.5. **Apply** neural networks to pattern classification and regression problems

CO.6. **Evaluate and compare** solutions by various soft computing approaches for a given problem.

Pre-Requisites: Mathematics

Name of the Course: Control System Lab	**Category: Professional Core Courses**

Course Outcome:

HM HU 501.1: Remembering the basic concepts, definitions, process know how of Economics for Engineers and recalling the terms already taught with the new list of terms.

HM HU 501.2: Understanding and interpreting the models of Economics for Engineers by stating the main ideas of the models and illustrating the related graphs and tables.

HM HU 501.3: Identifying the problems on the facts, techniques and rules and solving the same applying knowledge already acquired and utilizing the related formula.

HM HU 501.4: Analyzing the information and classifying them into different groups along with examining relationships, making inferences among the parameters of distinguished models.

HM HU 501.5: Evaluating different projects by comparing the benefits and costs related to the same, assessing the best option and recommending the same.

HM HU 501.6: Creating alternative solutions by adopting new ideas, compiling the existing information, designing new process with the objective of maximizing benefits or outcomes.

Course Code: PC-EI 591	**Semester: 5th**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination scheme:**
Tutorial: Nil	External Assessment:60
Practical: 2 hrs./week	Internal Assessment:40
Credit Points: 1.5	

Course Outcomes:	
CO. 1	To understand the different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response.
CO. 2	To assess the system performance using time domain analysis and methods for improving it.
CO. 3	To assess the system performance using frequency domain analysis and techniques for improving the performance
CO. 4	To design various controllers and compensators to improve system performance.
CO. 5	To develop the ability to communicate effectively with fellow group members for dividing and sharing the assignments among themselves.

Name of the Course: Industrial Instrumentation Lab	**Category: Professional Core Courses**
Course Code: PC EI 592	**Semester: 5th**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination scheme:**
Tutorial: Nil	External Assessment:60
Practical: 2 hrs./week	Internal Assessment:40
Credit Points: 1.5	

Course Outcomes:	
CO. 1	Illustrate the different methods for the measurement of temperature, pressure, flow and level.
CO. 2	Elucidate the construction and working of various industrial devices used to measure temperature, pressure, flow and level.
CO. 3	Explicate the construction and working of various industrial devices used to measure temperature, pressure, flow, level, viscosity and moisture.
CO. 4	Ability to analyze, formulate and select suitable sensor for the given industrial applications.
CO. 5	Demonstrate the knowledge of calibrations used in the measurement and control processes.
CO. 6	Demonstrate skills in trouble shooting problems with the measurement and control of industrial processes.

Name of the Course: Object Oriented Programming language Lab	**Category:** Open Elective Courses-I

Course Code: OE-EI 591	**Semester: 5th**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination scheme:**
Tutorial: Nil	External Assessment:60
Practical: 2 hrs./week	Internal Assessment:40
Credit Points: 1.5	

Course Outcome:

OE-EI 5911. Gain the basic knowledge on Object Oriented concepts.
OE-EI 5912. Ability to develop applications using Object Oriented Programming Concepts.
OE-EI 5913. Ability to implement features of object oriented programming to solve real world problems.
OE-EI 5914. Understand advanced features of C++ specifically stream I/O, templates and operator overloading
OE-EI 5915. Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism

Name of the Course: Data Base Management System Lab	**Category:**Open Elective Courses-I
Course Code: OE-EI 592	**Semester: 5th**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination scheme:**
Tutorial: Nil	External Assessment:60
Practical: 3 hrs./week	Internal Assessment:40
Credit Points: 1.5	

Course Outcome:

OE-EI 592.1. Understand, appreciate and effectively explain the underlying concepts of database technologies.
OE-EI 592.2. Design and implement a database schema for a given problem-domain.
OE-EI 592.3. Normalize a database.
OE-EI 592.4. Populate and query a database using SQL DML/DDL commands.
OE-EI 592.5. Programming PL/SQL including stored procedures, stored functions, cursors, packages.
OE-EI 592.6. Design and build a GUI application using a4GL

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Sixth Semester Details Syllabus under Autonomy

Course Name: Process Control	**Category:** Professional Core

Course Code: PC-EI 601	**Semester: VI**

Course Name: Electrical Machine	**Category:** Professional Core

L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam.: 70 Marks
Pre-Requisites: To understand this course, the learner must have idea of sensor and transducer, industrial instrumentation and control theory.	

Course Outcomes (COs):

CO.1. Explain the block diagram of different control loop with response curve and demonstrate its various components.

CO.2. Describes different process characteristics parameters with suitable examples.

CO.3. Compare different types of controllers according to their feature and tuning scheme for practical processes.

CO.4. Demonstrate the construction and use of different types of control valves with practical problems.

CO.5. Distinguish between different control schemes such as feedforward, ratio, cascade, split, override, adaptive and batch control.

CO.6. Describe modern control systems such as PLC, DCS and SCADA communicated by HART protocol..

Course Code: PC-EI 602	**Semester:** VI
L-T-P: 3-0-0	**Credit: 3**
Course Name: Analog and Digital Communication	**Category:** Professional Elective Course-II
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam.: 70 Marks
Pre-Requisites: Basic Electrical, Circuit Theory , Electromagnetic Theory	

Course Outcomes (COs):

After study through the course, students will be able to

CO.1. Deascribe the basic principle of operation of DC machine
CO.2. State the principle of operation and characteristics of DC motor and generator
CO.3. Understand and Apply the principle of operation, connections and different tests on Transformers
CO.4. Analyze the principle of operation and characteristics of single & three phase Induction machines
CO.5. Illustrate the principle of operation and characteristics of synchronous machine
CO.6. Design special eletro-mechanical devices

Course Code: PE-EI 601	**Semester: 6th**
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam.: 70 Marks
Pre-Requisites: Basic knowledge of analog and digital electronic circuits, signals and systems.	

Course Outcomes (COs):

After study through the course, students will be able to

CO.1. Gain the knowledge of components of analog and digital communication system.
CO.2. Demonstrate understanding of various analog and digital modulation and demodulation techniques.
CO.3. Analyze transmitter and receiver circuits used in communication systems.
CO.4. Evaluate the performance of modulation and demodulation techniques in various transmission environments.
CO.5. Compare and **contrast** design issues, advantages, disadvantages and limitations of analog and digital communication systems.
CO.6. Get acquainted with different generations of mobile communication system and their technicalities.

Course Name: Embedded System	**Category:** Professional Elective Course-II
Course Code: PE-EI 602	**Semester: 6th**
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam.: 70 Marks
Pre-Requisites: Microprocessor and Microcontroller	

Course Outcomes (COs)

PE-EI 602.1. Understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.
PE-EI 602.2. Understand the role of embedded systems in industry.
PE-EI 602.3. Understand the programming techniques of different microcontrollers.
PE-EI 602.4. Design processor and controller based intelligent systems for real life problems.

Course Name: POWER ELECTRONICS	**Category:** Professional Elective Course-III
Course Code: PE-EI 603	**Semester: VI**
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam.: 70 Marks
Pre-Requisites:	

Course Outcomes (COs):

PE-EI 603.1.1. To **describe** the functioning and characteristics of power switching devices.
PE-EI 603.1.2. To **state** different triggering circuits and techniques of commutation of SCR
PE-EI 603.1.3. To **apply** the principle of operation of phase controlled rectifier.
PE-EI 603.1.4. To **analyze** the principles of dc to dc converter.
PE-EI 603.1.5. To **illustrate** various types Inverters
PE-EI 603.1.6. To **design** various applications of converters

Course Name: VLSI & MICROELECTRONICS	**Category:** Professional Elective Course-III
Course Code: PE-EI 604	**Semester: 6th**
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25 Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam.: 70 Marks
Pre-Requisites: Knowledge in Basic Electronics, MOS, Transistors etc.	

Course Outcomes (COs):

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

CO.1. Tell about the technology, design concepts, design style, design principles, and design domains.

CO.2. Explain and distinguish various Microelectronics circuit fabrication process for VLSI circuit design.

CO.3. Apply the concepts of digital circuit design for designing VLSI circuits using MOS transistors

CO.4. Draw sticks diagram and Layout diagrams to represent VLSI design process.

CO.5. Describe the digital VLSI circuit design using VHSL language.

CO.6. Design and Develop combinational and sequential digital circuits applying the concepts applying the concept of digital circuit design and VHDL language.

Course Name: Internet of Things (IoT)	**Category:** Open Elective Courses -III
Course Code: OE-EI 601	**Semester: VI**
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam.: 70 Marks
Pre-Requisites: Basic concept of programming	

Course Outcomes (COs):

CO.1. Understand the application areas of IOT.
CO.2. Realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks.
CO.3. Understand building blocks of Internet of Things and characteristics.
CO.4. Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints.
CO.5. Building state of the art architecture in IoT**.**
CO.6. Design IoT applications for smart cities and smart houses

Course Name: Artificial Intelligence	**Category: Open Elective**
Course Code: OE-EI 602	**Semester: 7th**
L-T-P: 3-1-0	**Credit: 4**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: 1 hrs/week	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam.: 70 Marks
Pre-Requisites: Mathematics	

Course Outcomes (COs):

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

CO.1. Compare AI with human intelligence and traditional information processing and discuss its strengths and limitations.

CO.2. Discuss the core concepts and algorithms of advanced AI, including various searching, knowledge and reasoning, decision making, various learning process, natural language processing, robotics, and so on.

CO.3. Apply the basic principles, models, and algorithms of AI to recognize, model, and **solve** problems in the **analysis** and **design** of information systems.

CO.4. Analyze the structures and algorithms of a selection of techniques related to searching, reasoning, machine learning, and language processing.

CO.5. Design AI functions and components involved in intelligent systems such as computer games, expert systems, semantic web, information retrieval, machine translation, mobile robots, decision support systems, and intelligent tutoring systems.

CO.6. Explain various search techniques, knowledge & reasoning, and learnings used in expert systems

Course Name: Values and Ethics in Profession	**Category:** Humanities and Social Sciences
Course Code: HM-HU 601	**Semester: VI**
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 24	End Semester Exam.: 70 Marks
Pre-Requisites: No-prerequisite	

Course Outcomes:

HM-HU 601. 1. **Understanding** the significance of Indian ethos and culture and analyzing the implementation of ancient Indian thoughts in management today

HM-HU 601. 2. **Evaluating** how the ethical principles guide our moral actions and judgments and identifying how the unethical practices are standing as obstacles for socio-economic development.

HM-HU 601. 3. **Assessing** the ethical challenges and dilemmas of engineering practices and creating norms for administrating ethical management initiatives in an organization

HM-HU 601. 4. **Interpreting** the global principles of corporate social responsibility to design and develop an organization's plan towards societal growth and sustainability

HM-HU 601. 5. **Estimating** the impact of the rapid technological growth and applying varied eco-friendly technologies for sustainable development

HM-HU 601. 6. **Identifying** and **prioritizing** human values as core of our behavior to promote social stability and social progress thereby comprehending the process of living in peace and harmony

Course Name: Internet of Things Lab(IoT)	**Category: Open Elective -II**
Course Code: OE-EI691	**Semester: Sixth**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination scheme: Maximum marks:**

Tutorial: Nil	External Assessment:60
Practical: 3 hrs./week	Internal Assessment:40
Credit Points: 1.5	

Course Outcome:

At the end of the course, the students will be able to:

1. Gather engineering knowledge related to IoT.
2. Students can analysis the problem and able to design/develop the solutions
3. Implement basic IoT applications on embedded platform
4. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
5. AbletounderstandbuildingblocksofInternetofThingsandcharacteristics.
6. Design IoT applications in different domain and be able to analyze their performance

Name of the Course: Process Control Lab	**Category: Professional Core**
Course Code: PC-EI 691	**Semester: VI**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination scheme: Maximum marks: 100**
Tutorial: Nil	External Assessment:60
Practical: 2 hrs./week	Internal Assessment:40
Credit Points: 1.5	

Course Outcomes:	
CO. 1	**Define** P&I diagram for different types of Process control loops like Temperature, Pressure, Flow and Level.
CO. 2	**Demonstrate** the operations of different types of Process control loops.
CO. 3	**Operate** various field instruments related to different types of Process control loops.
CO. 4	**Compare** the merits and demerits among conventional control action with PLC and DCS.
CO. 5	**Perform** effectively as an individual and as a member in teams at the time of executing laboratory experiments.
CO. 6	**Conclude** the safety and maintenance issues related to those processes.

Name of the Course: Instrumentation System Design Lab	**Category: Professional Core Courses**
Course Code: PC-EI 692	**Semester: 6th**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination scheme:**
Tutorial: Nil	External Assessment:60
Practical: 2 hrs./week	Internal Assessment:40
Credit Points: 1.5	

Course Outcomes:

CO. 1	Learn the issues related to practical implementation of applications using electronic circuits.
CO. 2	Design sensors and suitable signal conditioning circuit.
CO. 3	Design process control loop.
CO. 4	To design various controllers and compensators to improve system performance.
CO. 5	To develop the ability to communicate effectively with fellow group members for dividing and sharing the assignments among themselves.

Name of the Course: Seminar	**Category: Seminar**
Course Code: EI 681	**Semester: Sixth**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination scheme: Maximum marks:**
Tutorial: Nil	External Assessment:60
Practical: 2 hrs./week	Internal Assessment:40
Credit Points: 2	

Course Outcomes:	
CO. 1	Graduates will demonstrate knowledge of Applied Sciences substrate with Allied field of engineering/technology.
CO. 2	Graduate will show the understanding of impact of engineering solutions on the society and also will be aware of contemporary issues.
CO. 3	Graduate will be able to communicate effectively in both verbal and written form through critical thinking process which will assist them in the preparation of their proposal and dissertation.
CO. 4	Pursue new and enriched understandings of the texts through sustained inquiry and reevaluate initial hypotheses in light of evidences.
CO. 5	Express, articulate, discuss and defend well formed arguments within a group or to an audience or to different engineering communities.
CO. 6	Graduate will develop confidence for self education and ability for life-long learning.

Haldia Institute of Technology
Department of Applied electronics and Instrumentation Engineering

Seventh Semester Details Syllabus under Autonomy

Course Name: Advanced Control System	**Category:** Professional Elective Course-IV

Course Code: PE-EI 701	**Semester: 7th**

Course Name: Biomedical and Analytical Instrumentation	**Category: Professional Elective Course- V**

L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: 1 hrs/week	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam.: 70 Marks
Pre-Requisites: 1. Basic Knowledge of Linear Control System 2. Basic Knowledge of Calculus of Variations	

Course Outcomes (COs):

At the end of the course the learner will be able to-

CO.1. **Define** and **describe** the mathematical and physical concepts Linearization process of nonlinear system, State Feedback Control, Sliding Mode Control, Optimal Control, Adaptive Control and their Stability Analysis.

CO.2. **Distinguish** between the linearizing method of Control and Nonlinear Control method.

CO.3. **Solve** practical problems of Physical systems through MATLAB or Python programming.

CO.4. **Plan** to **design** different Optimal Controllers using various Optimization Techniques.

CO.5. **Decide** and **Select** suitable nonlinear controller for different applications.

CO.6. **Analyze** and **Compare** effectiveness of various Modern Control theories in designing Controllers

Course Name: Non Destructive Testing	**Category:** Professional Elective Courses- **v**
Course Code: PE-EI 703	**Semester: 7th**
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 4 hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 40	End Semester Exam.: 70 Marks
Pre-Requisites: Students should have knowledge in Biology, signal processing, and engineering communication.	

Course Outcomes (COs):

CO.1. Understand the basic concept of Mechatronics system. Engineering for designing the mechatronics system.

CO.2. Analyze the different mathematical modelling of the liquid level, pneumatic systems, hydraulic systems and thermal systems for actuation of mechatronics systems.

CO.3. Understand the working of robot design with coordinate system.

CO.4. Apply the knowledge of different parts of robots for real time application and robot design.

CO.5. Understand and apply the robot kinematics in real time problem.

CO.6. Apply the knowledge in different application for mankind.

Course Code: PE-EI 704	**Semester: 7th**
L-T-P: 3-0-0	**Credit: 3**
Course Name: Telemetry & Wireless Sensor Network	**Category:** Open Elective Course IV
Teaching Scheme	**Examination Scheme**
Theory:3hrs./week	**Continuous Assessment:** 25Marks
Total Lectures:36	**Attendance:** 5 Marks
	End Semester Exam.: 70 Marks
Pre-Requisites: Engineering Physics	

Course Outcomes (COs):

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

CO.1. Understand why Non Destructive Testing (NDT) is useful for industry or clinical process.
CO.2. Understand and analyze different techniques of NDT General, Visual, Chemical and Mechanical system.
CO.3. Understand and analyze Ultrasonic wave used in NDT.
CO.4. Understand and analyze Ultrasonic method in Industry and Medical measurement techniques.
CO.5. Comprehend the methods of hazard identification and safety measures.

Course Name: Non-Conventional Energy Sources	**Category: Open Elective Courses IV**
Course Code: OE-EI 701	**Semester: 7th**
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 50	End Semester Exam.: 70 Marks
Pre-Requisites: Basic knowledge of Laplace transformation &Fourier transformation analog and digital communication, sensor and transduces, computer networks.	

Course Outcomes (COs):

After completing the course the student should be able to

CO.1. **Identify** the elementary concepts and system functional blocks of telemetry system and**utilize** the various coding techniques for information exchange.

CO.2. **Describe** utilities of various modulation and multiplexing processes in telemetry systems and their technicalities.

CO.3. **Understand** the building blocks of different modern communication systems and **apply** this knowledge to **design** different telemetry systems.

CO.4. **Get acquainted** to the concept of WSN and **list** its application areas.

CO.5. **Learn**the basics of WSN node Architecture and Network Architecture.

CO.6. **Design** WSN based remote metering systems for industrial and biometric applications which will lead to betterment of mankind.

L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Course Name: Computer Networks	**Category: Engineering Science**
Theory:3hrs./week	**Continuous Assessment:** 25Marks
Total Lectures:36	**Attendance:** 5 Marks
	End Semester Exam.: 70 Marks
Pre-Requisites: Electrical and Electronics Engineering	

Course Outcomes (COs):

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

CO.1. Understand the basic concept of Non-Conventional Energy source and application in real life.
CO.2. Understand and explain Solar Energy generation and application.
CO.3. Understand and apply Electricity Generation from Wind Energy
CO.4. Understand and apply Electricity Generation from Bio Energy and Bio diesel techniques.
CO.5. Understand and explain Electricity generation from Tidal, Wave and Thermal energy.
CO.6. Understand the audit and energy conservation**.**

Course Code: ES-CS 701	**Semester: Seventh**
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 36	End Semester Exam.: 70 Marks
Pre-Requisites: To understand this course, the learner must have idea of basic knowledge in computer.	

Course Outcomes (COs):

CO.1. The incumbent would be able to determine the comparison between Data (Analog, Digital), Signal (Analog, Digital) and how to be transmitted (analog, digital) through different media and different networking related terms as simplex, duplex, internet, reference models etc.

CO.2. The incumbent would be able to describe the techniques to correct post-transmission error by ARQs, error detection methods and describe and determine different medium access sub layers like ALOHA, MA.

CO.3. The incumbent would be able to differentiate repeaters, hubs, bridges, switches, routers, gateways and describe different necessary routing protocols and tables.

CO.4. The incumbent would be able to describe different application layer protocols like DNS, SMTP, HTTP, FTP etc. and characterize different types of data representation techniques.

CO.5. The incumbent would be able to determine how to improve the quality of services, the security of the system by digital signature, firewalls.

CO.6. The incumbent would be able to demonstrate modern topics like ATM, cable modem, WLAN, Bluetooth etc. to design terminal to terminal data transmission through wired or wireless media.

Name of the Course: Industrial Training Evaluation	**Category:** Industrial Training
Course Code: EI-781	**Semester: 7th**

Duration:	**Maximum Marks: 100**
Teaching Scheme	**Examination scheme: Maximum marks:**
Tutorial: Nil	External Assessment:60
Practical: hrs./week	Internal Assessment:40
Credit Points: 1	

Course Outcomes:	
CO. 1	Get the opportunity to **Apply** the knowledge and skills students have acquired on campus in a real-life work situation.
CO. 2	To provide students with opportunities for practical, hands-on learning from practitioners in the areas of specialization.
CO. 3	To expose students to a work environment, common practices, employment opportunities and work ethics in their relevant field.
CO. 4	To enhance the employability skills of the students.
CO. 5	Familiar with Modern tool usage, The engineer and society
CO. 6	Develop soft skills in management, team skill & leadership skill and responsibilities in the work environment.

Name of the Course: PROJECT-I	**Category: Project Stage-I**
Course Code: PW-EI-791	**Semester: 7th**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination scheme: Maximum marks:**
Tutorial: Nil	External Assessment:60
Practical: 6 hrs./week	Internal Assessment:40

Credit Points: 3	

Course Outcomes:	
CO. 1	**Identify** a particular domain for their project work and engage themselves in independent study to research literature in the identified domain.
CO. 2	**Recognize and formulate** the engineering problems in selected domain by consolidating the literature search, fundamental knowledge and skills in engineering to solve the identified engineering problem.
CO. 3	**Select** the engineering tools/components for solving the identified engineering problem and **accomplish** the budget analysis of the project through the utilization of resources (finance, power, area, bandwidth, weight, and size, any other).
CO. 4	**Sketch** the project planning, scheduling and execution control and **Perform** in the team, contribute to the team and mentor/lead the team.
CO. 5	**Design** and **develop** a functional product prototype by considering the prescribed standards/ safety norms.
CO. 6	**Demonstrate** the project in effective written and oral communication through the project report, four-page IEEE paper format, and presentation of the project work and **identify** the community that shall benefit through the solution to the identified engineering problem and also demonstrate concern for environment.

Course Name: Power Plant Instrumentation	**Category: Professional Elective Course-VI**
Course Code: PE-EI801	**Semester: VIII**
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures:30	End Semester Exam.: 70 Marks
Pre-Requisites: To understand this course, the learner must have idea of Sensor and Transducer, Industrial instrumentation and Process control.	

Course Outcomes (COs):

CO.1. Create an overall perception about different types of power plant like Thermal, Hydel and Nuclear along with the measuring instruments associated with these particular types of process.

CO.2. Evaluate instruments parameter to get overall control of a power plant by knowing the working
principle of each block such as Turbine, Condensers, Generators, Coal handling, Water treatment, Feed water, combustion air and flue gases.

CO.3. Analyze the feedback signal for different control unit of power plant such as Boiler control, Furnace draft control, Steam temperature control and Feed water control etc. The supervisory control and monitoring is accompanying with different control loop for enhanced closed loop responses.

CO.4. Apply all type of safety interlocks to ensure zero accident by incorporating protective gears, emergency measures and Alarm systems. Moreover, the pollution due to the power plant is also measured, monitor and control for the environmental safety.

CO.5. Understand the data handling processing, logging, acquisition, accounting, display and storage of
data from Power plant. The coupling between the turbine and generator along with transmission through three phases are considered as an output side of the power plant.

CO.6. Describes the modelling and simulation of power plant in HMI section using DCS and PLC for better closed loop control.

Course Code: PE-EI802	**Category: Professional Elective Courses-VI**
Course Name: NANO ELECTRONICS	**Semester: Eighth**

L-T-P: 3-0-0	**Credit: 3**
Course Name: Digital Image Processing	**Category:** Open Elective Course-V

Total Lectures: 34
Pre-Requisites: Basic Electronics

COURSE OUTCOME (CO):

PE-EI802.1: To identify the concept, advantages and challenges of Nano electronics
PE-EI802.2: To describe the characteristics of carrier distribution and transport in nanoscale structures
PE-EI802.3: To apply the concept of different types of nano diodes, nano transistors and their junction physics
PE-EI802.4: To analyze the construction and operation of various nano display, logic and memory devices
PE-EI802.5: To evaluate different nano-photonics devices for optical fiber sensor systems
PE-EI802.6: To design various nano fiber sensors for industrial applications like temperature, pressure, displacement, fluid flow, rotation, etc.

Course Code: OE-EI 801	**Semester: 8th**
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**
Theory: 4 hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures: 43	End Semester Exam.: 70 Marks
Pre-Requisites: Digital Signal Processing, Signals and Systems	

Course Outcomes (COs):

CO.1. Mathematically represent the various types of images and **formulate** them for further processing.

CO.2. **Evaluate** images for enhancement of certain properties or for optimized use of the resources.

CO.3. **Analyze** images in the frequency domain using various transforms.

CO.4. **Implement** the algorithms related to morphological image processing.

CO.5. **Design andimplement** algorithms that perform basic image processing (e.g. noise removal and image enhancement).

CO.6. **Design and implement** algorithms for advanced image analysis (e.g. image compression, image segmentation).

Course Name: Big Data Analysis	**Category: Professional Elective V**
Course Code: OE-EI 802	**Semester: VIII**
L-T-P: 3-0-0	**Credit: 3**
Teaching Scheme	**Examination Scheme**

Theory: hrs./week	Continuous Assessment: 25Marks
Tutorial: Nil	Attendance: 5 Marks
Total Lectures:36	End Semester Exam.: 70 Marks
Pre-Requisites:	

Course Outcomes (CO):

The students will be able to -

OE-EI 802.1: Upon completion of this course, students will be able to do the following:
OE-EI 802.2: Students will to build and maintain reliable, scalable, distributed systems with Apache Hadoop.
OE-EI 802.3: Students will be able to write Map-Reduce based Applications Learning with MLlib.
OE-EI 802.4: Students will be able to design and build MongoDB based Big data Applications and learn MongoDB query language
OE-EI 802.5: Students will learn difference between conventional SQL query language and NoSQL basic concepts
OE-EI 802.6: Students will learn tips and tricks for Big Data use cases and solutions.

Course Code: HM-HU 801	**Category: Humanities and social sciences including Management Courses**
Course Name: Project Management and Entrepreneurship	**Semester: Eighth**

L-T-P: 3-0-0	**Credit: 2**
Total Lectures: 30	
Pre-Requisites:	

Course Outcomes (CO):

The students will be able to -

1. To understand the basic concept of management, diagnose the management issues in organizations, explain and analyze key principles of management planning, leading and controlling in business organizations
2. To explain the ethical standards and external environmental aspects of the organizations, list and exercise social responsibility and sustainability in the practical context and maintaining good governance for organization
3. To explain the basic concept, tools and environmental framework of marketing management and its importance on the organization in order to develop the effective marketing communications strategy
4. To explain the basic concept and functions of human resource management, human resource development and their applications in the organization, training and knowledge of human factors in engineering and various job designs
5. To evaluate various kinds of skills in inter-personal communication, team work, leading people, and handling conflict in organizations
6. To understand individual personalities and interpersonal skills needed for effective communications in a diverse business environment

Course Code	**HU801EI**					
Category	**Management**					
Course title	**Project Management and Entrepreneurship**					
Scheme and Credits	**L**	**T**	**P**	**Cr. Points**	**Lec. Hrs.**	**Semester:**
	3	**0**	**0**	**3**	**30**	**VIII**

Pre-requisites (if any)	- **Fundamentals of Management, Elementary Mathematics**

Course Outcome (CO):

After successful completion of this course, the student will be able to:

CO-1: The incumbent will learn general concept of a project and project management, the importance of project life cycle and essential elements of project planning.

CO-2: The incumbent will learn fundamentals of project evaluation, project scheduling as well as project cost control through application of financial and mathematical tools.

CO-3: The incumbent will learn about legal and quality aspects of project management to face various issues.

CO-4: The incumbent will learn the features of different project management software with special emphasis on "MS Project" and can able to select the best PMS subject to desired requirements.

CO-5: The incumbent will learn fundamentals of entrepreneurship both theoretical and practical approach and can take initiative of starting a new business.

CO-6: The incumbent can align the successful approach of entrepreneurship in undertaking large investment projects for the necessity and benefit of the society.

Name of the Course: PROJECT-II	**Category: Project Stage-II**
Course Code: PW-EI-891	**Semester: 8th**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination scheme: Maximum marks:**
Tutorial: Nil	External Assessment:60
Practical: 12 hrs./week	Internal Assessment:40
Credit Points: 6	

Course Outcomes:

CO. 1	**Identify** a particular domain for their project work and engage themselves in independent study to research literature in the identified domain.
CO. 2	**Recognize and formulate** the engineering problems in selected domain by consolidating the literature search, fundamental knowledge and skills in engineering to solve the identified engineering problem.
CO. 3	**Select** the engineering tools/components for solving the identified engineering problem and **accomplish** the budget analysis of the project through the utilization of resources (finance, power, area, bandwidth, weight, and size, any other).
CO. 4	**Sketch** the project planning, scheduling and execution control and **Perform** in the team, contribute to the team and mentor/lead the team.
CO. 5	**Design** and **develop** a functional product prototype by considering the prescribed standards/ safety norms.
CO. 6	**Demonstrate** the project in effective written and oral communication through the project report, four-page IEEE paper format, and presentation of the project work and **identify** the community that shall benefit through the solution to the identified engineering problem and also demonstrate concern for environment.