Hooghly Engineering & Technology College

Course Outcome

Mechanical Engineering Department

1 st Year Curriculum Structure for B.Tech courses in Engineering & Technology(Applicable from the academic session 2018-2019)

Course Code : ES-ME191/	Category : Engineering Science	Course Outcomes
Courses Course Title : Engineering Graphics & Design	**Semester :** First/ Second	● Introduction to engineering design and its place in society
L-T-P : 1-0-4	**Credit:** 3	● Exposure to the visual aspects of engineering design
Pre-Requisites:		● Exposure to engineering graphics standards and orthographic views of engineering components
		● Understand the logic behind the section of solids and development of surfaces.
		● Exposure to solid modeling and its concept in practical applications.

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Course Code : ES-ME192/	Category : Engineering Science	Course Outcomes
Courses Course Title : Workshop/ Manufacturing Practices	**Semester :** First/ Second	Upon completion of this laboratory course, students will be
L-T-P : 1-0-4	**Credit:** 3	● Acquire "Hands on" training and practice to students for use of various tools, devices and machine
Pre-Requisites:		● Acquire thorough knowledge of carrying out various operations in mechanical engineering workshop
		● They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.

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		● By assembling different components, they will be able to produce small devices of their interest.
		● Acquire skills in basic engineering practice for creating objects from raw materials

Semester-III (Academic session 2018-2019)

Subject Code : PC-ME391	Category : Professional Core courses	Course Outcomes
Subject Name : Practice of Manufacturing Processes	Semester : Third	● To build practical knowledge about Pattern Making; pattern material, pattern allowances and types of patterns casting processes
L-T-P : 0-0-3	Credit: 3	
Pre-Requisites: No-prerequisite		● To apply practical understanding for use of molding tools: green sand molding, gating system, risering system, core making.
		● To plan and create jobs using forging processes
		● To relate the job manufactured from practical relevance point of view
		● To understand and plan for machining of gears

Semester-V (Academic session 2018-19)

Subject Code : : PC-ME591	Category : Professional Core Courses	Course Outcomes
Subject Name : Mechanical Engineering Laboratory (Thermal) I	Semester : Fifth	After completion of the course, students will be able to:
L-T-P : 0-0-3	Credit: 1.5	● To understand the principles and performance characteristics of flow and thermal devices
Pre-Requisites: : Engineering Thermodynamics and Fluid Mechanics and Fluid Machines		● To know about the measurement of the fluid properties

- To understand the principle of measurement of the calorific value of a given fuel and its flash and fire point
- To understand the principle of measurement of the convective heat transfer coefficient for flow over a flat plate
- To determine the emissivity of a given sample

Subject Code : : PC-ME592	Category : Professional Core Courses	Course Outcomes
Subject Name : Machine Drawing-II	Semester : Fifth	After completion of the course, students will be able to:
L-T-P : 0-0-3	Credit: 1.5	● Understand and apply the knowledge of machine drawing as a system of Communication in which ideas are expressed clearly and all information fully conveyed.
Pre-Requisites: : Engineering Drawing		● To understand the design of a system, component or process to meet desired needs within, realistic constraints such as manufacturability, economic, environmental, safety & sustainability etc., to represent a part drawing and assembly drawings.
		● To identify, formulate, analyze and solve Engineering Problems in Optimum time.
		● Schematic product symbols for standard components in mechanical, electrical and electronic systems and joints
		● Understand the assembly drawing of different mechanical components and joints

Subject Code : : PW-ME581	Category : Project (Summer internship)	Course Outcomes

Subject Name : Project-I	Semester : Fifth	Students will be able
L-T-P : 0-0-2	Credit: 1	● o gather some exposure on some projects. ● may be designing some innovative ideas, fabricating and/or demonstrating an innovative machine or product, etc. ● Students are able to apply various soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship organization. ● Students are able to test theoretical learning in practical situations by accomplishing the tasks assigned during the internship period. ● Student is able to analyze the functioning of internship organization and recommend changes for improvement in processes
Pre-Requisites: : Nil		

Semester-VII (Academic session 2018-19)

Subject Code : : PC-ME791	Category Professional Core Courses	Course Outcomes
Subject Name Mechanical Engineering Laboratory III (Manufacturing)	Semester : Seventh	At the end of the course, a student will be able to: ● Study cutting forces in machining processes
L-T-P : 0-0-3	Credit: 1.5	● Test the quality of weld and molding sands
Pre-Requisites: Manufacturing Processes, Manufacturing Technology		● Develop a practical understanding of advanced manufacturing processes. ● Understand the working of a robot and its programming ● Identify and rectify defects in parts and manufacturing processes related problems.

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Subject Code : : PW-ME781	Category Project	Course Outcomes
Subject Name Project-III	Semester : Seventh	Students will be able
L-T-P : 0-0-6	Credit: 3	• To carry out some project works based on some design or fabrication or experimental problems in a group that builds team spirit and would get sufficient exposure for the way to proceed to solve a practical or design problem.
Pre-Requisites: All courses		• Identify a topic in advanced areas of Mechanical Engineering.
		• Review literature to identify gaps and define objectives & scope of the work.
		• Generate and implement innovative ideas for social benefits
		• Develop prototypes/models, experimental set-up and software systems necessary to meet the objectives.

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Subject Code : ES-ME401	Category : Engineering Science Course	Course Outcomes
Subject Name : Materials Engineering	Semester : Fourth	Students will be able to
L-T-P : 3-0-0	Credit: 3	● Identify crystal structures for various materials and understand the defects in such structures.
Pre-Requisites: No-prerequisite		● Understand how to tailor material properties of ferrous and non-ferrous alloys. ● Quantify mechanical integrity and failure in materials. ● Understand a detailed interpretation of equilibrium phase diagrams ● Understand about different phases and heat treatment methods to tailor the properties of Fe-C alloys

Subject Code : PC-ME401	Category : Professional Core courses	Course Outcomes
Subject Name : Applied Thermodynamics	Semester : Fourth	After completing this course, the students will be able to
L-T-P : 3-1-0	Credit: 4	● get a good understanding of various practical power cycles and heat pump cycles.
Pre-Requisites: No-prerequisite		● analyze energy conversion in various thermal devices such as combustors, air coolers, nozzles, diffusers, steam turbines and reciprocating compressors. ● understand phenomena occurring in high speed compressible flows. ● understand about the properties of dry and wet air and the principles of psychrometry ● analyze the performance of steam turbines

Subject Code : PC-ME402	Category : Professional Core courses	Course Outcomes
Subject Name : Fluid Mechanics & Fluid Machines	Semester : Fourth	Upon completion of this course, students will be able to
L-T-P : 3-1-0	Credit: 4	● mathematically analyze simple flow situations ● Evaluate the performance of pumps and turbines.
Pre-Requisites: No-prerequisite		● learn about the application of mass and momentum conservation laws for fluid flows ● understand the importance of dimensional analysis

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		understand the velocity and pressure variations in various types of simple flows

Subject Code : PC-ME403	Category : Professional Core courses	Course Outcomes
Subject Name : Strength of Materials	Semester : Fourth	After completing this course, the students should be able to
L-T-P : 3-1-0	Credit: 4	● Recognize various types of loads applied on machine components of simple geometry and understand the nature of internal stresses that will develop within the components.
Pre-Requisites: No-prerequisite		● Evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading.
		● Evaluate principal stresses, maximum shearing stress, and the stresses acting on a structural member. Understand Mohr's circle and be able to determine principal stresses
		● Evaluate the deflections and rotations produced by the three fundamental types of loads: axial, torsional, and flexural.
		● Analyze slenderness ratio, long columns and short columns subjected to axial loads, and Euler buckling load calculation

Subject Code : PC-ME404	Category : Professional Core courses	Course Outcomes
Subject Name : Metrology & Instrumentation	Semester : Fourth	Upon successful completion of the course, student will have
L-T-P : 3-1-0	Credit: 4	● Understand the working of linear and angular measuring instruments.
Pre-Requisites: No-prerequisite		● Know the fundamentals of limits and limit gauges, various methods for measurement of screw thread and surface roughness parameters and the working of optical measuring instruments.
		● Acquire an overview of mechanical measurement systems and principle of instruments for motion and dimension measurement.
		● Get basic idea about working principle and applications of devices for measurement of force and torque; strain and stress and temperature.
		● get an exposure to advanced measuring devices and machine tool metrology

Subject Code : PC-ME601	Category : Professional Core Courses	Course Outcomes
Subject Name : Manufacturing Technology	Semester : Sixth	● Tooling for conventional and non-conventional machining processes
L-T-P : 4-0-0	Credit: 4	● To describe machines and related tools for manufacturing various components.
Pre-Requisites: : Primary Manufacturing Processes		● To understand the relationship between process and system in the manufacturing domain. ● To experiment on CNC machine tools. ● To demonstrate rapid prototyping methods.

Subject Code : PC-ME602	Category : Professional Core Courses	Course Outcomes
Subject Name : Design of Machine Elements	Semester : Sixth	Upon completion of this course, students will able to ● get an overview of the design methodologies employed for the design of various machine components.
L-T-P : 3-1-0	Credit: 4	
Pre-Requisites: : Strength of materials, Machine Drawing		● get a strong background in mechanics of materials based failure criteria underpinning the safety-critical design of machine components ● get an understanding of the origins, nature and applicability of empirical design principles, based on safety considerations ● get an overview of codes, standards and design guidelines for different elements ● get an appreciation of the relationships between component level design and overall machine system design and performance

Subject Code : : PE-ME601A	Category Professional Elective Courses	Course Outcomes
Subject Name : : Internal Combustion Engines and Gas Turbine	Semester : Sixth	● Students will be able to understand basic concepts of actual cycles with analysis and to describe the fundamental concepts of IC engines along with its working principles.
L-T-P : 3-0-0	Credit: 3	

Pre-Requisites: Thermodynamics, Heat Transfer		● Students can be familiar with the combustion phenomenon in SI and CI engines. ● Students will be able to evaluate the performance of IC engines and the importance of alternate fuels. ● Students will be familiar with the essential components of a gas turbine along with its performance improving methods. ● Students will be able to understand the working principle of different types of Jet propulsive engines and Rockets.

Subject Code : : PE-ME602B	Category Professional Elective Courses	Course Outcomes
Subject Name :Refrigeration & Air Conditioning	Semester : Sixth	After completing this course, the students will ● Understand the principles of refrigeration and air conditioning.
L-T-P : 3-0-0	Credit: 3	● Know about the systems of Refrigeration, Air-Conditioning and Ventilation.
Pre-Requisites: Thermodynamics, Heat Transfer		● Learn about different components of these systems. ● Know about designing a Refrigeration and Air-Conditioning system. ● Calculate the cooling load for different applications.

Semester-VIII (Academic session 2018-19)

Subject Code : : : PE-ME801B	Category Professional Elective Courses	Course Outcomes
Subject Name Power Plant Engineering	Semester : Eighth	At the end of the course, student will be able to ● Understanding of Thermal Power Plant Operation, turbine governing, different types of high pressure boilers including supercritical and supercharged boilers, Fluidized bed combustion systems
L-T-P : 3-0-0	Credit: 3	
Pre-Requisites: Thermodynamics, Heat Transfer		● Understand functions of the various components of a power plant. ● Design of chimney in thermal power plants, knowledge of cooling tower operation, numerical on surface condenser design. ● Understanding of Power Plant Economics, Energy Storage including compressed air energy and pumped hydro etc ● Estimate the feasibility and its implications on power generating units.

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Subject Code : : : PE-ME801E	Category Professional Elective Courses	Course Outcomes
Subject Name Tribology	Semester : Eighth	Lerner will be able to ● Apply knowledge of tribology for industrial component design. ● Apply design concepts practically for automotive lubrication systems. ● To provide knowledge of friction and wear mechanisms in the automotive system. ● Understand elasto hydrodynamic Lubrication and Gas Lubrication ● Understand concept and scope of surface engineering
L-T-P : 3-0-0	Credit: 3	
Pre-Requisites: Fluid Mechanics, Design of Machine Elements		

Subject Code : : : OE-ME801D	Category Open Elective Courses	Course Outcomes
Subject Name Industrial Pollution and Control	Semester : Eighth	After completing this course, the students will ● Know about the various types of pollution caused by the industries and their effects on the environment. ● Know specifically about the causes, processes and control techniques of air pollution. ● Know specifically about the causes, processes and control techniques of water pollution. ● Know specifically about the causes, processes and control techniques of noise pollution.
L-T-P : 3-0-0	Credit: 3	
Pre-Requisites: Basic Chemistry, Thermodynamics, Fluid Mechanics		

Subject Code : : : OE-ME801H	Category Open Elective Courses	Course Outcomes
Subject Name Internet of Things	Semester : Eighth	At the end of the course, the student will be able to: ● Understand internet of Things and its hardware and software components ● Interface I/O devices, sensors & communication modules ● Remotely monitor data and control devices, and develop real life IOT based projects ● Design principles and needed capabilities of IoT ● Know Solution framework for IoT applications
L-T-P : 3-0-0	Credit: 3	
Pre-Requisites: Sensors, System Integration, Cloud and Network Security		

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Semester-III (Academic session 2018-2019)

Subject Code : ES-ME301	Category : Engineering Science	Course Outcomes
Subject Name : Engineering Mechanics	**Semester** : Third	**At the end of this course students will be able to**
L-T-P : 3-1-0	**Credit**: 4	● Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.
Pre-Requisites: No-prerequisite		● Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.
		● Understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts).
		● Understand basic dynamics concepts – force, momentum, work and energy.
		● Understand and be able to apply basic dynamics concepts - the Work-Energy principle, Impulse-Momentum principle and the coefficient of restitution.
Subject Code : PC-ME301	**Category** : Professional Core courses	**Course Outcomes**
Subject Name : Thermodynamics	**Semester** : Third	**After completing this course, the students will be able to learn**
L-T-P : 3-1-0	**Credit**: 4	● about work and heat interactions, and balance of energy between the system and its surroundings
Pre-Requisites: No-prerequisite		● about application of Ist law to various energy conversion devices
		● To evaluate the changes in properties of substances in various processes
		● To understand the difference between high grade and low grade energies
		● limitations of 2nd law on energy conversion.
Subject Code : BS-BIO301	**Category** : Basic Science course	**Course Outcomes**

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Subject Name : Biology Semester	Semester : Third	After studying the course, the student will be able to:
L-T-P : 3-0-0	Credit: 3	● Describe how biological observations of 18th Century lead to major discoveries.
Pre-Requisites: No-prerequisite		● Convey that classification per se is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological
		● Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring
		● Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine
		● Classify enzymes and distinguish between different mechanisms of enzyme action and identify DNA as a genetic material in the molecular basis of information transfer.

Subject Code : ES-ECE301	Category : Engineering Science Courses	Course Outcomes
Subject Name : Basic Electronics Engineering	Semester : Third	At the end of this course students will demonstrate the ability to
L-T-P : 3-0-0	Credit: 3	● Understand the principles of semiconductor devices and their applications.
Pre-Requisites: No-prerequisite		● Design an application using an Operational amplifier.
		● Understand the working of timing circuits and oscillators.
		● Understand logic gates, flip flops as a building block of digital systems.
		● Learn the basics of Electronic communication systems.

Subject Code : PC-ME302	Category : Professional Core courses	Course Outcomes
Subject Name : Manufacturing Processes	Semester : Third	After completion of this course, students will be able to understand
L-T-P : 3-1-0	Credit: 4	

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Pre-Requisites: No-prerequisite		● The different conventional and non-conventional manufacturing methods employed for making different products.
		● Distinguish the various casting methods for product making with their merits and demerits
		● Distinguish the various material joining processes and associated defects with possible cause and cure.
		● Distinguish the various process involved in sheet metal forming with its applications and salient features
		● Various machining processes, force components, tool wear and tool life Surface finish and integrity, Machinability, Cutting tool materials, Cutting fluids, Coating etc.

Semester-V (Academic session 2018-19)

Subject Code : PC- ME501	Category : Professional Core courses	Course Outcomes
Subject Name : Heat Transfer	Semester : Fifth	**After completing the course, the students will be able**
L-T-P : 3-1-0	Credit: 4	● to formulate and analyze a heat transfer problem involving any of the three modes of heat transfer
Pre-Requisites: Engineering Thermodynamics		● to obtain exact solutions for the temperature variation using analytical methods where possible or employ approximate methods or empirical correlations to evaluate the rate of heat transfer
		● to design devices such as heat exchangers and also estimate the insulation needed to reduce heat losses where necessary.
		● explain the concept of one dimensional steady and transient heat conduction through various systems
		● Apply the conduction, convection and radiation principles in product application by real time study

Subject Code : PC- ME502	Category : Professional Core courses	Course Outcomes
Subject Name : Solid Mechanics	Semester : Fifth	After completion of this course, students will be able to understand
L-T-P : 3-1-0	Credit: 4	

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Pre-Requisites: Engineering Mechanics		• the deformation behavior of solids under different types of loading and obtain mathematical solutions for simple geometries. • to present the mathematical and physical principles in understanding the linear continuum behavior of solids • familiar with the concept of strain, derivation of small strain tensor and compatibility. • compute torsion of non- circular cross-sections with stress concentration • Apply the various constitutive equations concepts on to real time applications

Subject Code : PC- ME503	Category : Professional Core courses	Course Outcomes
Subject Name : Kinematics and Theory of Machines	Semester : Fifth	After completing this course, the students • can design various types of linkage mechanisms for obtaining specific motion and analyze them for optimal functioning
L-T-P : 3-1-0	Credit: 4	
Pre-Requisites: Engineering Mechanics		• Compute the unbalanced forces on reciprocating and rotating masses. • can understand the motion of linked mechanisms in terms of the displacement, velocity and acceleration at any point in a rigid link • can able to design some linkage mechanisms and cam systems to generate specified output motion • can understand the kinematics of gear trains and the control mechanisms of governor and gyroscope with their applications.

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Semester-VII (Academic session 2018-19)

Subject Code : : PC-ME701	Category Professional Core Courses	Course Outcomes
Subject Name : Advanced Manufacturing Technology	Semester : Seventh	Student will be able ● To understand non- traditional machining processes and the effect of process parameters
L-T-P : 3-0-0	Credit: 3	● To differentiate the various non-traditional machining processes
Pre-Requisites: Manufacturing Processes, Manufacturing Technology		● To demonstrate micromachining technology ● To understand the principles of material removal mechanism of advanced machining processes such as mechanical, electro-chemical and thermal. ● To basic understanding of the machining capabilities, limitations, and productivity of advanced manufacturing technologies.

Subject Code : : HM-HU701	Category Professional Core Courses	Course Outcomes
Subject Name : Economics for Engineers	Semester : Seventh	Student will be able ● To understand Economic Decisions Making criteria
L-T-P : 2-0-0	Credit: 1	● To know basic principles of engineering costs, estimation and depreciation analysis.
Pre-Requisites: Nil		● To understand basic accounting principles. ● To make general awareness among budding engineers regarding basic principles of economics and that needed to be used in an industry. ● To give basic understanding of engineering costs, estimation, depreciation analysis and basic accounting principles.

Subject Code : : PE-ME701A	Category Professional Elective Courses	Course Outcomes
Subject Name Automobile Engineering	Semester : Seventh	At the end of the course, the student will be able to: ● Understand the basic lay-out of an automobile.
L-T-P : 3-0-0	Credit: 3	

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Pre-Requisites: Thermodynamics, Kinematics & Theory of Machines		● understand the operation of engine cooling, lubrication, ignition, electrical and air conditioning systems. ● Illustrate the principles of transmission, suspension, steering and braking systems. ● Demonstrate automotive electronics devices. ● Study the latest developments in automobiles.

Subject Code : : PE-ME701H	Category Professional Elective Courses	Course Outcomes
Subject Name Advanced Welding Technology	Semester : Seventh	● To impart knowledge about different welding processes and their applicability. ● To familiarize the basic mechanism behind weld joint and influencing factors. ● To impart the knowledge of different tests to judge soundness of the weld joint. ● Effect of different process parameters on the characteristics of weldment. ● To understand critical and precision Welding processes
L-T-P : 3-0-0	Credit: 3	
Pre-Requisites: Manufacturing Processes		

Subject Code : : OE-ME701D	Category Open Elective Courses	Course Outcomes
Subject Name Non-Conventional Energy Resources	Semester : Seventh	After completing this course, the students will ● know about the energy scenario at present and the need of using renewable energy for sustainability. ● Demonstrate the generation of electricity from various Non-Conventional sources of energy, have a working knowledge on types of fuel cells. ● Understand the concept of Biomass energy resources and their classification, types of biogas Plants applications ● To have an idea about different sources of renewable energy that would be sustainable. ● To have the concept of using solar energy for heating as well as Photovoltaic Generation.
L-T-P : 3-0-0	Credit: 3	
Pre-Requisites: Thermodynamics, Fluid Dynamics and Heat Transfer		

1 st Year Curriculum Structure for B.Tech courses in Engineering &Technology (Applicable from the academic session 2018-2019)

Course Code : ES-ME 291	Category : Engineering Science	Course Outcomes
Courses Course Title : Engineering Graphics & Design	Semester : First/ Second	● Introduction to engineering design and its place in society ● Exposure to the visual aspects of engineering design ● Exposure to engineering graphics standards and orthographic views of engineering components ● Understand the logic behind the section of solids and development of surfaces. ● Exposure to solid modeling and its concept in practical applications.
L-T-P : 1-0-4	Credit: 3	
Pre-Requisites:		

Course Code : ES-ME 292	Category : Engineering Science	Course Outcomes
Courses Course Title : Workshop/ Manufacturing Practices	Semester : First/ Second	Upon completion of this laboratory course, students will be ● Acquire "Hands on" training and practice to students for use of various tools, devices and machine ● Acquire thorough knowledge of carrying out various operations in mechanical engineering workshop ● They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
L-T-P : 1-0-4	Credit: 3	
Pre-Requisites:		

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		• By assembling different components, they will be able to produce small devices of their interest.
		• Acquire skills in basic engineering practice for creating objects from raw materials

Fourth Semester (Academic session 2018-2019)

Subject Code : PC-ME491	Category : Professional Core courses	Course Outcomes
Subject Name : : Practice of Manufacturing Processes and Systems Laboratory	Semester : Fourth	After taking this course the student will be able to:
L-T-P : 0-0-3	Credit: 1.5	• Understand the working of Logic Gates practically, designed pneumatics / hydraulics systems.
Pre-Requisites: No-prerequisite		• Measure length and angles using line-graduated instruments, i. e. vernier calipers, micrometers, bevel protractor, sine bar and surface plates; • Get basic ideas about working principle and applications of devices for measurement of force and torque; strain and stress and temperature. • Get a basic idea about various methods for measurement of screw thread and surface finish parameters. • Practicing different gauges to assess angles, thread, internal and external radius, etc.

Subject Code : PC-ME492	Category : Professional Core courses	Course Outcomes
Subject Name : Machine Drawing I	Semester : Fourth	After taking this course the student will be able to:
L-T-P : 0-0-3	Credit: 1.5	• Draw and identify welding symbols, represent and identify welded joints on drawings by means of these symbols.
Pre-Requisites: No-prerequisite		• Draw and identify schematic product symbols for standard components in electrical and electronic systems, draw and identify symbols for pipe joints and fittings and prepare piping layouts.

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		- Construct isometric views of simple machine parts from orthographic projections and vice versa. - Draw and understand different sectional views - full, half, broken, revolved, removed and auxiliary sections of machine parts and understand sectioning conventions. - Practicing AutoCAD or similar graphics software's and making orthographic and isometric projections of different components.

Semester-VI (Academic session 2018-19)

Subject Code : : PC-ME691	Category Professional Core Courses	Course Outcomes
Subject Name : Mechanical Engineering Laboratory (Design) II	Semester : Sixth	Students will be able to • understand the measurement of mechanical properties of materials • understand the deformation behavior of materials • understand the kinematic and dynamic characteristics of mechanical devices • understand the effect of unbalanced resulting from rotary motions • understand single degree of freedom spring-mass-damper system and torsional vibration of single and double rotor systems undammed and damped natural frequencies and damping coefficient
L-T-P : 0-0-3	Credit: 1.5	
Pre-Requisites: :		

Subject Code : : PW-ME681	Category Project (Summer Internship)	Course Outcomes
Subject Name : : Project-II	Semester : Sixth	Students will be able to ● Understand the procedure to carry out practical projects related to any technical event/ competition to fabricate and demonstrate an innovative machine or product, etc. ● Understand the application of theoretical knowledge gained in coursework to real-world projects during the internship.
L-T-P : 0-0-4	Credit: 2	
Pre-Requisites: :		

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		●Develop proficiency in creating professional reports, presentations, and documentation related to the internship project.
		●Understand the ability to identify, analyze, and solve problems encountered during the internship, displaying critical thinking and creative problem-solving skills.
		●Establish and nurture professional relationships within the industry, showcasing the ability to network, seek mentorship, and leverage opportunities for future career advancement.

Semester-VIII (Academic session 2018-19)

Subject Code : : : PW-ME881	Category Project	Course Outcomes
Subject Name Project- IV	Semester : Eighth	Students will be able to
L-T-P : 0-0-10	Credit: 3	● Carry out some project works based on some design or fabrication or experimental problems in a group building up team spirit and would get sufficient exposure for the way to proceed to solve a practical or design problem.
Pre-Requisites: All courses		● Learn to identify methods and materials to carry out experiments/develop code.
		● Analyze and discuss the results to draw valid conclusions
		● Learn to prepare a report as per recommended format and defend the work
		● Explore the possibility of publishing papers in peer reviewed journals/conference proceedings

Subject Code : : : PW-ME882	Category Professional Core Courses	Course Outcomes
Subject Name Comprehensive Viva-Voce	Semester : Eighth	Students will be able to
L-T-P : 0-0-0	Credit: 1.5	●Prepare for the interview in a better way by brushing up different course papers so that overall

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Pre-Requisites: All courses		knowledge on Mechanical Engineering areas would be sharpened.
		● logical and lucid discussions on mechanical engineering topics, ensuring the ability to convey ideas and concepts fluently
		● Illustrate the assimilation of theoretical knowledge gained during the course with practical applications in the field of mechanical engineering.
		● Exhibit awareness of the social and ethical responsibilities associated with the practice of mechanical engineering.
		● Assess the holistic knowledge and skills acquired during the course emphasizing their ability to think critically, communicate effectively, and apply engineering principles in diverse contexts.

H.O.D.
Mechanical Engineering
Hooghly Engineering & Technology College

Course: ECE

Course code:003

Efeective from academic year:2018-2019

Course Outcomes

Fiber Optic Communication (PE-EC801B)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Fiber Optic Communication (PE-EC801B)	Understand the principles fiber-optic communication, the components and the bandwidth advantages.
	Understand the properties of the optical fibers and optical components.
	Understand operation of lasers, LEDs, and detectors
	Analyze system performance of optical communication systems
	Design optical networks and understand non-linear effects in optical fibers

Course Outcomes

Mixed Signal Design (PE-EC802A)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Mixed Signal Design (PE-EC802A)	Understand the practical situations where mixed signal analysis is required
	Analyze and handle the inter-conversions between signals.
	Design systems involving mixed signals

Course Outcomes

Internet of Things(IoT) (OE-EC803A)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to.....
Internet of Things(Io T) (OE-EC803A)	understand the application areas of IOT.
	realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
	understand building blocks of Internet of Things and characteristics.

Saubhojit Malik

Course Outcomes

Artificial Intelligence (OE-EC804A)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Artificial Intelligenc e (OE-EC804A)	understand the modern view of AI as the study of agents that receive percepts from the environment and perform actions.
	demonstrate awareness of the major challenges facing AI and the complex of typical problems within the field.
	exhibit strong familiarity with a number of important AI techniques, including in particular search, knowledge representation, planning and constraint management.
	asses critically the techniques presented and to apply them to real world problems.

Shyamal Pal

Course Outcomes

Project-II(EC-882)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Project-I (EC-782)	Design a system, component, or process to meet desired needs within realistic constraints such as economic, social, ethical, manufacturability, and sustainability
	Design and conduct experiments, as well as to analyse and interpret data
	Use the techniques, skills, and modern engineering tools necessary for engineering practice.
	Engage in research and to identify, formulates, and solves engineering problems to involve in life-long learning.
	Function on team environment and contributing effectively in diverse settings.

3

Course Outcomes

Satellite Communication (PE-EC701B)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Satellite Communication (PE-EC701B)	Visualize the architecture of satellite systems as a means of high speed, high range communication system.
	State various aspects related to satellite systems such as orbital equations, sub-systems in a satellite, link budget, modulation and multiple access schemes
	Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions

Course Outcomes

Mobile Communication and Networks (PE-EC701C)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to.....
Mobile Communication and Networks (PE-EC701C)	Understand the working principles of the mobile communication systems.
	Understand the relation between the user features and underlying technology.
	Analyze mobile communication systems for improved performance

4

Course Outcomes

Digital Image and Video Processing (PE-EC702B)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Digital Image and Video Processing (PE-EC702B)	Mathematically represent the various types of images and analyze them.
	Process these images for the enhancement of certain properties or for optimized use of the resources.
	Develop algorithms for image compression and coding

Subhojit Malik

H.E.T.C. Hooghly

DIC, ECE Deptt.
HETC, Hooghly.

Course Outcomes

Wireless Sensor Networks (PE-EC703B)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Wireless sensor network (PE-EC703B)	Design wireless sensor networks for a given application
	Understand emerging research areas in the field of sensor networks
	Understand MAC protocols used for different communication standards used in WSN
	Explore new protocols for WSN

Course Outcomes

Web Technology (OE-EC704A)

Course Title And Course Code	Course Outcomes
	At the end of the course the students will be able to.....
Web Technology (OE-EC704A)	design good web pages using different tags, tables, forms, frames and style sheets supported by HTML.
	implement, compile, test and run Java programs, comprising more than one class, to address a particular software problem
	demonstrate the ability to employ various types of selection statements and iteration statements in a Java program.
	be able to leverage the object-oriented features of Java language using abstract class and interface
	be able to handle errors in the program using exception handling techniques of Java
	design applets as per the requirements with event handling facility

Course Outcomes

Project-I (EC-782)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Project-I (EC-782)	Design a system, component, or process to meet desired needs within realistic constraints such as economic, social, ethical, manufacturability, and sustainability
	Design and conduct experiments, as well as to analyse and interpret data
	Use the techniques, skills, and modern engineering tools necessary for engineering practice.
	Engage in research and to identify, formulates, and solves engineering problems to involve in life-long learning.
	Function on team environment and contributing effectively in diverse settings.

Course Outcomes

Economics for Engineers(HS-HU 601)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Economics for Engineers (HS-HU 601)	analyze financial statements of the companies and other business entities and to determine their financial situation
	gain competency in preparing Balance Sheet, Income Statements, Cost Sheet, etc. of the business organizations
	gain efficiency in project evaluation after analyzing its underlying benefits and costs
	demonstrate the understanding of contemporary issues and provide engineering solutions for solving social problems

RB

7

Course Outcomes

Control System and Instrumentation (EC601)

Course Title And Course Code	Course Outcomes
	At the end of the course the students will be able to…..
Control System and Instrumentation (EC601)	Characterize a system and find its steady state behavior.
	Investigate stability of a system using different tests.
	Design various controllers
	Solve linear, non linearand optimal control problems.
	Study with CRO, Wave analyzer, Spectrum analyzer knowing their functional details.

Serbhojet Malik

Course Title: Computer Network

Code: EC602

Department: Electronics and Communications Engineering

Semester: 6th

COURSE OUTCOMES :

On completion of the course students will be able to

CO1: Describe the concepts of Data Communication, Reference models and network technologies.

CO2: Explain how communication works in data networks and the Internet.

CO3: Understand the router architecture, IP and routing algorithms.

CO4: Understand the concepts of Network security and cryptography protocols.

CO5. Understand the multimedia network applications, audio, video streaming and network management.

_____
Signature of Teacher

_____
Signature of DIC/Coordinator/HOD

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Course Outcomes

Information Theory and Coding (PE-EC603D)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Information Theory and Coding (PE-EC603D)	Understand the concept of information and entropy
	Explain the operation of various instruments required in measurements
	Calculation of channel capacity
	Apply coding techniques

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Course Outcomes

Operating System (OE-EC604B)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Operating System (OE-EC604B)	understand the difference between different types of modern operating systems, virtual machines and their structure of implementation and applications.
	understand the difference between process & thread, issues of scheduling of user-level processes / threads and their issues & use of locks, semaphores, monitors for synchronizing multiprogramming with multithreaded systems and implement them in multithreaded programs.
	Apply the measurement techniques for different types of tests
	understand the design and management concepts along with issues and challenges of main memory, virtual memory and file system.

Course Outcomes

Object Oriented Programming (OE-EC604C)

Course Title And Course Code	Course Outcomes
	At the end of the course the students will be able to......
Object Oriented Programming (OE-EC604C)	differentiate between structures oriented programming and object oriented programming.
	use object oriented programming language like C++ and associated libraries to develop object orientedprograms.
	understand and apply various object oriented features like inheritance, data abstraction, encapsulation andpolymorphism to solve various computing problems using C++ language.
	apply concepts of operator-overloading, constructors and destructors
	apply exception handling and use built-in classes from STL.

Shyamal Pal

H.E.T.C. Hooghly

ECE Deptt. HETC, Hooghly.

Course Outcomes

Mini Project/ Electronic Design Workshop (EC681)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Mini Project/ Electronic Design Workshop (EC681)	Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
	Design, implement and test the prototype/algorithm in order to solve the conceived problem.
	Write comprehensive report on mini project work

Course Outcomes

Control and Instrumentation Lab (EC691)

Course Title And Course Code	Course Outcomes
	At the end of the course the students will be able to.....
Control and Instrumentation Lab (EC691)	familiarize with MATLAB Control System tool box, MATLAB-SIMULINK tool box and representation of pole zero and transfer function of control system.
	determine the transfer function of a given system from its state model and its vice-versa.
	simulate the step response and impulse response for Type-I and Type-II system with unity feedback using MATLAB.
	determine the impulse & step response for 2nd order under damped system on CRO & calculation of control system specifications for variation of system design.
	determine the Root locus, Bode Plot and Nyquist Plot to evaluate system parameters like marginal value of gain, frequency etc. of a given control system.
	design PI, PD and PID controller for specified system requirements.
	study of static (accuracy, precision, repeatability, linearity) and dynamic (fidelity, speed of response) characteristics of a measuring instrument.
	design the PI, PD, PID controller action and Instrumentation Amplifier for specified system requirements.
	study and analysis of electrical signal with CRO.

Subhojit Malik

H.E.T.C.
Hooghly

ECE Deptt.
TC, Hooghly.

Course Outcomes

Electromagnetic Waves (EC501)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to.....
Electromagnetic Waves (EC501)	Understand characteristics and wave propagation on high frequency transmission lines
	Carryout impedance transformation on TL
	Use sections of transmission line sections for realizing circuit elements
	Characterize uniform plane wave
	Calculate reflection and transmission of waves at media interface
	Analyze wave propagation on metallic waveguides in modal form
	Understand principle of radiation and radiation characteristics of an antenna

Anjan Bhattacharya.

H.E.T.C. Hooghly

DIC, ECE Deptt. HETC, Hooghly.

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Course Outcomes

Computer Architecture (EC502)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to.....
Computer Architecture (EC502)	learn how computers work
	know basic principles of computer's working
	analyze the performance of computers
	know how computers are designed and built
	Analyze wave propagation on metallic waveguides in modal form
	Understand principle of radiation and radiation characteristics of an antenna
	Understand issues affecting modern processors (caches, pipelines etc.)

Course Outcomes

Digital Communication and Stochastic (EC503)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Digital Communication and Stochastic (EC503)	understand the concept of Stochastic Process in Communication System
	represent various signals in different mathematical forms
	analyze baseband transmission mode of digital data
	analyze different career modulation techniques considering noise aspects

Course Outcomes

Digital Signal Processing (EC504)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Digital Signal Processing (EC504)	Represent signals mathematically in continuous and discrete time and frequency domain
	Get the response of an LSI system to different signals
	Design of different types of digital filters for various applications

Subhojit Malik

Course Outcomes

Power Electronics(PE-EC505C)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Power Electronics (PE-EC505C)	Build and test circuits using power devices such as SCR
	Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters,
	Learn how to analyze these inverters and some basic applications.
	Design SMPS

Course Outcomes

Human Resource Management (OE-EC506C)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Human Resource Managem ent (OE-EC506C)	know the professional and personal qualities of a HR manager.
	learn different methods of selecting human resources through recruitment, training and performanceappraisal system.
	know how to develop a favourable working environment in an organisation through participation in management and maintain a good industrial relation for benefit of the society.
	know about consequence of industrial dispute and employee indiscipline of an organization.

COURSE OUTCOMES

Paper Name: SOFT SKILL & INTERPERSONAL COMMMUNICATION
Paper Code: OE-EC 506 A
Department: ECE
Semester: 5th

After completing this course, the students will be able to:

1. Become self-confident individuals by mastering interpersonal skills, team management skills, and leadership skills.
2. Plan self-development and practice self-assessment to function on multi-disciplinary teams.
3. Illustrate and examine the knowledge of ethical aspects of engineering.
4. Demonstrate and explain social and professional etiquette.
5. Develop creative acumen, set practical goals and motivate themselves accordingly.
6. Manage time and stress effectively, resolve conflicts and make the best decisions.

Subham Ganguly 16.11.2020
SIGNATURE OF FACULTY

Mukherje 16.11.2020
SIGNATURE OF HOD

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COURSE OUTCOMES

Paper Name: EFFECTIVE TECHNICAL COMMUNICATION

Paper Code: MC-HU 501

Department: ECE

Semester: 5th

After completing this course, the students will be able to:

1. Build confidence in listening, speaking, reading and writing English professionally.

2. Think and speak effectively on everyday topics, including topics related to technical concepts

3. Master the basics of Academic writing

4. Develop industry-ready attitude towards professional communication.

5. Prepare for competitive exams like TOEFL, IELTS

Subham Ganguly
16.11.2020
SIGNATURE OF FACULTY

Mukherjee
16.11.2020
SIGNATURE OF HOD

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Course Outcomes

Electromagnetic Wave Laboratory (EC591)

Course Title And Course Code	Course Outcomes
	At the end of the course the students will be able to.....
Electromagnetic Wave Laboratory (EC591)	Understand various antenna parameters and their deffinitions.
	Find out VSWR, reflection coefficients and normalized impedance on Smith chart
	Plot of radiation pattern of different antenna.

Aryan Bhallacharya.

HOD, ECE Deptt.
HETC, Hooghly.

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Course Outcomes

Digital Communication Laboratory (EC592)

Course Title And Course Code	Course Outcomes
	Course Outcomes
	At the end of the course the students will be able to…..
Digital Communication Laboratory (EC592)	Study PAM and its demodulation & PCM and its demodulation techniques
	Study line coders: polar / unipolar / bipolar NRZ , RZ and Manchester
	Study BPSK and ASK modulator and demodulator
	Study QPSK modulator and demodulator.
	Study delta and adaptive delta modulator and demodulator
	Effectively communicate and present (verbally and in writing) necessary theoretical concepts, experimental results and their analyses.

Course Outcomes

Digital Signal Processing Laboratory (EC593)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
	create different sampled sinusoidal signal and various sequences and perform different arithmetic operations.
	perform convolution of two sequences using graphical methods and using commands to verify the properties of convolution.
	find out and analyze various sequences after taking z-transform and also verify the properties of z-transform.
	verify the properties of Twiddle factor.
Digital Signal Processing Lab (EC593)	calculate DFTs / IDFTs using matrix multiplication and also using commands.
	understand the concept and calculation of circular convolution of two sequences using graphical methods and using commands and differentiate between linear and circular convolutions.
	design Butterworth filter with different set of parameters and FIR filter using rectangular, Hamming and Blackman windows
	write and execute small programs related to arithmetic operations and convolution using Assembly Language of TMS320C 5416/6713 Processor
	write small programs in VHDL and download onto Xilinx FPGA.

Subhojit Malik

Course Outcomes

Analog Communication (EC401)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to.....
Analog Communication (EC401)	The learner must be able to appreciate the need for modulation and calculate the antenna size for different carrier frequencies. From the functional representation of the modulated carrier wave, the learner must be able to identify the type of modulation, calculate the side-band frequencies, identify the modulating and carrier frequencies, decide the type of generation method to be adopted. Solve problems.
	Module - 2: After understanding the basic concepts the learner must be able to compare between the different demodulation methods, design an envelope detector, calculate the IF and image frequencies for the superheterdyne receivers given the carrier and modulating frequencies, calculate the oscillator frequency.
	Module - 3: From the functional representation of the modulated carrier wave, the learner must be able to identify the type of modulation, calculate the side-band frequencies, identify the modulating and carrier frequencies, decide the type of generation method to be adopted. Solve problems.
	Module - 3: From the functional representation of the modulated carrier wave, the learner must be able to identify the type of modulation, calculate the side-band frequencies, identify the modulating and carrier frequencies, decide the type of generation method to be adopted. Solve problems.

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Course Outcomes

Analog circuits (EC402)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Analog circuits (EC402)	Understand the characteristics of diodes and transistors
	Design and analyze various rectifier and amplifier circuits
	Design sinusoidal and non-sinusoidal oscillators
	Understand the functioning of OP-AMP and design OP-AMP based circuits

Course Outcomes

Microprocessor & Microcontroller (EC403)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Microprocessor & Microcontroller (EC403)	Do assembly language programming
	Do interfacing design of peripherals like, I/O, A/D, D/A, timer etc.
	Develop systems using different microcontrollers
	Understand the functioning of OP-AMP and design OP-AMP based circuits
	Understand RSIC processors and design ARM microcontroller based systems

Jagadish Bhattacharya

DIC, ECE Deptt.
HETC, Hooghly.

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Course Outcomes

Design and Analysis of Algorithm (ES-CS401)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Design and Analysis of Algorithm (ES-CS401)	For a given algorithms analyze worst-case running times of algorithms based on
	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms
	Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation
	Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming and develop the dynamic programming algorithms, and analyze it to determine its computational complexity
	For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems.
	Explain the ways to analyze randomized algorithms (expected running time, probability of error)
	Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS).

S. Daw

COURSE OUTCOME

Paper Name	Paper Code	Course	Course Outcome
Numerical Methods (BS)	BS-M401	ECE (2nd year, 4th semester)	1. Ability to tackle problems where analytical methods are difficult or fail. Analyse and evaluate the accuracy to obtain approximate solutions to mathematical problems 2. Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems 3. Efficiency in formulation of numerical algorithms in engineering problems 4. Implement numerical methods in Matlab. Write efficient, well-documented Matlab code and present numerical results in an informative way 5. Excellence use of numerical methods for approximate value of integration and forecasting of data

R. Patra
21/01/2020

Banjee
3/2/22

AMukherjee 03/02/2019
H. O. D.
Basic Science & Humanities Department
H. E. T. C., Hooghly.

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Course Outcomes

Biology for Engineers

(BS-B401)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Biology for Engineers (BS-B401)	Convey that classification per se is not what biology is all about but highlight the underlying
	criteria, such as morphological, biochemical and ecological Highlight the concepts of recessiveness and dominance during the passage of genetic material
	from parent to offspring Convey that all forms of life have the same building blocks and yet the manifestations are as
	diverse as one can imagine Classify enzymes and distinguish between different mechanisms of enzyme action
	Identify DNA as a genetic material in the molecular basis of information transfer.• Analyse biological processes at the reductionistic level
	Apply thermodynamic principles to biological systems.• Identify and classify microorganisms

Course Outcome (CO) for Electronics and Communications Engineering Department

Physics – II (PH 401)	Apply knowledge of quantum mechanics to analyze and interpret data of nanoscale electronic devices
	Apply knowledge on crystal structure gives enormous information about the active material of different electronic devices
	Apply knowledge of optics which is very useful to characterize the surface, to identify the inner structure of atoms for the fabrication of high-performance devices
	Apply the principles of Acoustics to design a system, component, or process to meet desired needs within realistic constraints

H.O.D.
Basic Science & Humanities Department
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2b

COURSE OUTCOMES

Paper Name: SOFT SKILL DEVELOPMENT LAB

Paper Code: HS-HU 481

Department: ECE

Semester: 4th

After completing this course, the students will be able to:

1. Communicate in English confidently

2. Communicate appropriately in professional and social situations

3. Improve teamwork, leadership, and problem-solving skills through group activities like GD, case studies, Role-play, etc.

4. Organize and write correctly and learn proper business correspondence

5. Do active listening

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SIGNATURE OF HOD

COURSE OUTCOMES

Paper Name: TECHNICAL REPORT WRITING & LANGUAGE LABORATORY PRACTICE

Paper Code: HU 481

Department: ECE/CSE/CE

Semester: 4th

After completing this course, the students will be able to:

1. Inculcate a sense of confidence.
2. Grow up as a good communicator, both socially and professionally.
3. Enhance their power of Technical Communication.

4. Confidently pitch proposals and ideas through presentations in the professional domain.

Subham Ganguly
27.07.18

SIGNATURE OF FACULTY

P. Debnath
27.7.18

SIGNATURE OF HOD

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Course Outcomes

Analog Communication Lab (EC491)

Course Title And Course Code	Course Outcomes
	Course Outcomes At the end of the course the students will be able to.....
Analog Communication Lab (EC491)	Measure modulation index of an AM signal, output power with varying modulation index of an AM signal (for both DSB- & SSB), distortion of the demodulated output with varying modulation index of an AM signal (for both DSB-SC & SSB).
	Measure power of different frequency components of a frequency modulated signal & the measure of the bandwidth and Design a FM demodulator using PLL
	Measure the selectivity, sensitivity, fidelity of a super heterodyne receiver.
	Design a PLL using VCO & to measure the lock frequency
	Study waveforms of various functional points (output of RF,IF & video) of a B/W TV receiver and vertical & horizontal sweep of the time base unit of a B/W TV

Course Outcomes

Analog Electronic Circuits Lab (EC492)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Analog Electronic Circuits Lab (EC492)	Design and test rectifiers, clipping circuits, clamping circuits and voltage regulators
	Compute the parameters from the characteristics of JFET and MOSFET devices.
	Design, test and evaluate BJT amplifiers in CE configuration.
	Design and test JFET/MOSFET amplifiers.
	Design and test a power amplifier.
	Design and test various types of oscillators.

Course Outcomes

Microprocessor & Microcontroller Lab (EC493)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to.....
Microprocessor & Microcontroller Lab (EC493)	familiarization with 8085 and 8051 trainer kit andsimulator
	write assemble language programs on 8085µp trainer kitsusing basic instruction set (data transfer, Load/Store,Arithmetic)
	use 8085 µp trainer kits to write assemble language programs using branch instructions for examples: Look up Table, Copying an Array, Shifting an Array, String Matching, Multiplication using repetitive addition, Division, Largest and Smallest no. from an array, Arrangan array in Ascending and Descending order, Fibonacci series, Factorial of a number.
	write assemble language programs on trainer kits such as: Packing & Unpacking of a numbers, BCD addition & BCD Subtraction, Binary to ASCII conversion.
	write assemble language program using subroutine calls and IN/OUT instructions using 8255 PPI on the trainer kit e.g. subroutine for delay, glowing LEDs accordingly.

Course Outcomes

Numerical Methods Lab (BS) (BS-M491)

Course Title And Course Code	Course Outcomes
	At the end of the course the students will be able to.....
Numerical Methods Lab (BS) (BS-M491	solve an algebraic or transcendental equation using Bisection, Regular-falsi and Newton Raphson methods
	Calculate a definite integral using Trapezoidal rule, Simpson's 1/3 rule and Weddle's rule.
	Solve ordinary differential equation using Euler's method and Runga-Kutta method.
	Approximate a function using different Interpolation methods.
	Solve a linear system of equations using using Gauss elimination and Gauss-Seidel iteration methods.
	Implement numerical methods in Matlab.

DC, ECE Deptt.
HETC, Hooghly.

Course Outcome (CO) for Electronics and Communications Engineering Department

Physics –II Laboratory (PH 491)	Convert units by using conversion factors, unit analysis and calculate instrumental error analysis.
	Explain the difference between tensile stress and shear stress
	Find the modulus of elasticity of a material
	Apply the basic laws of physics in different aspects of physical world.
	Classify different characteristics of light

Ghosh
24/7/18

H.E.T.C.
Hooghly

H.O.D.
Basic Science & Humanities Department
H. E. T. C., Hooghly.
27.7.18

2/8

Course Outcomes

Electronic Devices (EC301)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Electronic Devices (EC301)	Differentiate the conduction techniques in semi-conductor materials.
	Analyze characteristics of Semi-conductor diodes and solve problems.
	Analyze characteristics of Bi-polar Transistors and solve problems.
	Analyze characteristics of MOS Transistors and solve problems.
	Differentiate between different Opto-electronic devices.

Course Outcomes

Digital System Design (EC302)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Digital System Design (EC302)	Design and analyze combinational logic circuits
	Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder
	Design & analyze synchronous sequential logic circuits

Course Outcomes

Signals and System (EC303)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Signals and System (EC303)	Analyze different types of signals
	Represent continuous and discrete systems in time and frequency domain using different transforms
	Design & analyze synchronous sequential logic circuits
	Sampling and reconstruction of a signal

D/C, ECE Deptt.
HETC, Hooghly.

Course Outcomes

Network Theory (EC304)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Network Theory (EC304)	Understand basics electrical circuits with nodal and mesh analysis.
	Appreciate electrical network theorems
	Apply Laplace Transform for steady state and transient analysis.
	Determine different network functions.
	Appreciate the frequency domain techniques.

COURSE OUTCOME

Paper Name	Paper Code	Course	Course Outcome
Numerical Methods	M(CS) 301	ECE (2nd year, 3rd semester)	1. Ability to tackle problems where analytical methods are difficult or fail
			2. Competency to use numerical methods where analytical solutions are not amenable to numerical interpretation
			3. Efficiency in formulation of numerical algorithms in iteration problems
			4. Competency to tackle transcendental equations and boundary value differential equations with variable coefficients
			5. Excellence use of numerical methods for approximate value of integration and forecasting of data

A. Debnath 25.7.18
H. O. D.
Basic Science & Humanities Department
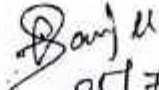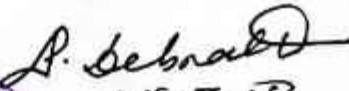H. E. T. C., Hooghly.

R. Patra
24/07/2018

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COURSE OUTCOME

Paper Name	Paper Code	Course	Course Outcome
Mathematics	M 302	ECE (2nd year, 3rd semester)	1. Understand the use of periodic signals and Fourier series to analyse circuits 2. Ability to apply knowledge of integral transforms in control and signal systems 3. Efficiency to use methods of complex analysis to find poles and zeros in digital signal problems 4. Excellence to apply effectively the methods of probability theories in signal processing and control systems etc 5. Ability to apply knowledge of ODE, PDE, integrals and series expansions to arrive at solutions of many electronic engineering problems

R. Patra
25/07/2018

P. Debnath
25.7.18
H. O. D.
Basic Science & Humanities Department
H. E. T. C., Hooghly.

Banju
25|7|18

P. Debnath
25.7.18

H.E.T.C.
Hooghly

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Course Outcomes

Data Structure & Algorithms (ES-CS301)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to.....
Data Structure & Algorithms (ES-CS301)	For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
	For a given Search problem (Linear Search and Binary Search) student will able to implement it.
	For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.
	Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
	Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity

Course Outcomes

Electronics Devices Lab (EC391)

Course Title And Course Code	Course Outcomes
	At the end of the course the students will be able to…..
Electronics Devices Lab (EC391)	An ability to verify the working of different diodes, transistors, CRO probes and measuring instruments. Identifying the procedure of doing the experiment.
	Ability to understand the characteristics of BJT and FET and how to Determine different parameters for designing purpose
	Ability to understand properties of photoelectric devices
	Ability to measure and record the experimental data, analyze the results, and prepare a formal laboratory report.

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Course Outcomes

Data Structure & Algorithm Lab (ES-CS391)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Data Structure & Algorithm Lab (ES-CS391)	understand the basics principle's of Abstract Data Type with their domain, actions and functions
	verify the functionality of different abstract data type by implementing stack, queue, linked list etc using c programming language
	apply skills to think logically a step by step solutions of a real problem and implements it using the concept of procedural programming language like C
	correlate the relationship among the data to give the best solution among the many possible solutions of a given problem in terms of Time and Space complexity.
	grab the concept of liner and non linear data structure and applying the knowledge to give a support to the user specific requirement through the implementation using C programming language

Course Outcomes

Digital System Design Lab(EC392)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Digital System Design Lab (EC392)	design & realize combinational circuit like Basic gates , simple arithmetic circuit , Four –bit parity generator, Code Conversion circuit, comparator circuits, Decoder & Multiplexer circuit
	design and realize RS, JK and D flip-flops
	design and realize Universal Register
	design and realize Asynchronous Up/Down counter, Synchronous Up/Down counter, Sequential Counter , Ring counter and Johnson's counter

Jagadish Bhattacharya

ECE Deptt.
HETC, Hooghly.

H.E.T.C. Hooghly

Course Outcomes

Environmental Science (MC381)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Environmental Science (MC381)	apply causes of land pollution in solid waste management
	apply knowledge of various causes of water pollution in electronic waste management
	apply knowledge of ecosystem in controlling renewable energy (solar energy) and designing eco-friendly electronic gadgets
	apply knowledge of noise pollution in effective communication system.

COURSE OUTCOME

Paper Name	Paper Code	Course	Course Outcome
Mathematics III (Probability & Statistics)	BS-M301	ECE (2nd year, 3rd semester)	1. The students will learn the ideas of probability and random variables and various discrete and continuous probability distributions and their properties 2. The students will learn the basic ideas of statistics including measures of central tendency, regression 3. The students will learn the statistical methods of studying data samples 4. To provide an overview of probability and statistics to engineers

R. Patre
04/07/2019

AMukherjee 04/07/2019

H. O. D.
Basic Science & Humanities Department
H. E. T. C., Hooghly.

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COURSE OUTCOMES

Paper Name: ENGLISH

Paper Code: HM-HU 201

Department: CSE/ECE/EE/ME/EE

Semester: 2nd

After completing this course, the students will be able to:

1. The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

2. Strengthen their vocabulary by understanding the concept of word formation, acquaintance with root words from foreign language and their use in English

3. Improve their verbal-aptitude skills

4. Improve their knowledge of English grammar

5. Write Précis, Essays, Business Letters, Cover Letters & CV; E-mail, etc.

Subham Ganguly
27·07·18

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Course Outcomes

Programming for Problem Solving (ES-CS291)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Programming for Problem Solving (ES-CS291)	To formulate the algorithms for simple problems
	To be able to correct syntax errors as reported by the compilers
	To be able to identify and correct logical errors encountered at run time
	To be able to write iterative as well as recursive programs
	To be able to represent data in arrays, strings and structures and manipulate themthroughaprogram
	To translate given algorithms to a working and correct program
	To be able to declare pointers of different types and use them in defining self-referentialstructures.
	To be able to create, read and write to and from simple text file.

Shyamal Pal

H.E.T.C. Hooghly

C, ECE Deptt.
HETC, Hooghly.

Course Outcomes

Programming for Problem Solving (ES-CS201)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to.....
Programming for Problem Solving (ES-CS201)	To translate the algorithms to programs (in C language).
	To test and execute the programs and correct syntax and logical errors.
	To implement conditional branching, iteration and recursion.
	To decompose a problem into functions and synthesize a complete programusing divide and conquer approach.
	To use arrays, pointers and structures to formulate algorithms and programs.
	To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
	To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

Shyamal Pal

COURSE OUTCOMES

Paper Name: LANGUAGE LABORATORY

Paper Code: HM-HU 291

Department: CSE/ECE/EE/ME/EE

Semester: 2nd

After completing this course, the students will be able to:

1. Acquire basic proficiency in English

2. Improve their reading and listening skills

3. Develop effective writing and speaking skills

4. Master Linguistic/Paralinguistic features (Pronunciation/Phonetics/Voice modulation/ Stress/ Intonation/ Pitch & Accent) of connected speech

5. Improve teamwork, leadership, and problem-solving skills through group activities like GD, case studies, Role-play, etc.

Subham Ganguly 27.07.18

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A. Debnath 27.7.18

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HOOGHLY ENGINEERING & TECHNOLOGY COLLEGE

Vivekananda Road Pipulpati, Hooghly-712102

COURSE OUTCOME

Paper Name	Paper Code	Course	Course Outcome
Workshop/ Manufacturing Practices	ES ME 292	Electronics & Communication Engineering	1. Acquire "Hands on" training and practice to students for use of various tools, devices, and machine. 2. Acquire thorough knowledge of carrying out various operations in mechanical engineering workshop. 3. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes. 4. By assembling different components, they will be able to produce small devices of their interest. 5. Acquire skills in basic engineering practice for creating objects from raw materials

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H.O.D.
Mechanical Engineering
Hooghly Engineering & Technology College

COURSE OUTCOME

Paper Name	Paper Code	Course	Course Outcome
Mathematics IIB	BS-M202	ECE (1st year, 2nd semester)	1. Learn the methods for evaluating multiple integrals and their applications to different physical problems 2. Understand different techniques to solve first and second order ordinary differential equations with its formulation to address the modelling of systems and problems of engineering sciences 3. Learn different tools of differentiation and integration of functions of a complex variable that are used with various other techniques for solving engineering problems 4. Apply different types of transformations between two 2- dimensional planes for analysis of physical or engineering problems

AMukherje 02/01/2019

H. O. D.
Basic Science & Humanities Department
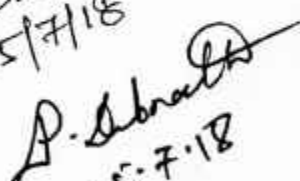H. E. T. C., Hooghly.

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A. Debroth
2.1.19

COURSE OUTCOME

Paper Name	Paper Code	Course	Course Outcome
Mathematics IB	BS-M102	ECE (1st year, 1st semester)	1. Apply the concept and techniques of differential and integral calculus to determine curvature and evaluation of different types of improper integrals 2. Understand the domain of applications of mean value theorems to engineering problems 3. Learn the tools of power series and Fourier series to analyse engineering problems and apply the concept of convergence of infinite series in many approximation techniques in engineering disciplines 4. Apply the knowledge for addressing the real-life problems which comprises of several variables or attributes and identify extremum points of different surfaces of higher dimensions 5. Understand different types of matrices, their Eigen values, Eigen vectors, rank and their orthogonal transformations which are essential for understanding physical and engineering problems

Burju
25/7/18

P. Debnath
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P. Debnath 25.7.18
H. O. D.
Basic Science & Humanities Department
H. E. T. C., Hooghly.

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Course Outcomes

Basic Electrical Engineering (ES-EE101)

Course Title And Course Code	Course Outcomes
	At the end of the course the students will be able to.....
Basic Electrical Engineering (ES-EE101)	To understand and analyze basic electric and magnetic circuits
	To study the working principles of electrical machines and power converters
	To introduce the components of low voltage electrical installations

Course Outcomes

Basic Electrical Engineering Laboratory (ES-EE191)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to…..
Basic Electrical Engineering Laboratory (ES-EE191)	correlate the theoretical knowledge with the practical one and to analyze possible causes of discrepancy in comparison to theory
	assess the characteristics of different lamps (e.g. carbon, tungsten lamp and fluorescent lamp) experimentally for better understanding of energy efficiency
	be competent with the processes of analyzing different (dc and ac) electrical network experimentally for better understanding of electrical network systems
	correlate the theoretical knowledge with the practical one and to analyze possible causes of discrepancy in comparison to theory

HOOGHLY ENGINEERING AND TECHNOLOGY COLLEGE

COURSE (SUB) OUTCOME

Course (Sub)Title : Chemistry – I Laboratory		
Course (Sub)Code : BS-CH 191	**Stream : ECE**	**Semester: 1st**
Course (Sub) Outcomes		
CO No.	**CO**	
1	On completion of this course students will be able to investigate different properties of metals.	
2	On completion of this course students will be able to analyze the different components of soil which is require for understanding soil mechanism.	
3	On completion of this course students will be able to analyze different parameters of drinking and sewage water.	
4	On completion of this course students will be able to handle different types of new gadgets which they normally practice in the laboratory.	
5	On completion of this course students will be able to develop efficiency in data analysis which is normally require for getting desirable result in different experiments.	

25.07.18 Mukherjee 25/07/18
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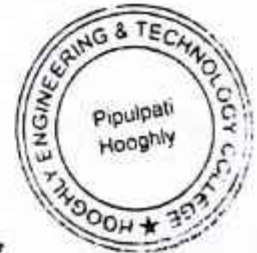
Vivekananda Road Pipulpati, Hooghly-712102

COURSE OUTCOME

Paper Name	Paper Code	Course	Course Outcome
Engineering Graphics & Design	ES ME 191	Electronics & Communication Engineering	1. Introduction to engineering design and its place in society 2. Exposure to the visual aspects of engineering design 3. Exposure to engineering graphics standards and orthographic views of engineering components 4. understand the logic behind the section of solids and development of surfaces. 5. Exposure to solid modelling and its concept in practical applications.

S. Ghosh

BG

H.O.D.
Mechanical Engineering
Hooghly Engineering & Technology College

HOOGHLY ENGINEERING AND TECHNOLOGY COLLEGE

COURSE (SUB) OUTCOME

Course (Sub)Title : Chemistry – I		
Course (Sub)Code : BS-CH 101	Stream : ECE	Semester: 1st
Course (Sub) Outcomes		

CO No.	CO
1	Analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2	Rationalize bulk properties and processes using thermodynamic considerations.
3	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
4	Rationalize periodic properties such as ionization potential, electronegativity and oxidation states.
5	List of major chemical reactions that are used in synthesis of molecules.

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Basic Science & Humanities Department
H. E. T. C., Hooghly.

Course Outcome (CO) for Electronics and Communications Engineering Department

Physics –1 Lab (BS PH191/291)	Observe and read data in slide calliper's, screw gauge. Calculate different modulus of elasticity to apply basic knowledge Physics of Elasticity and apply viscosity principle of streamline motion of water to calculate its viscosity coefficient required in fluid mechanics
	Arrange sequential connection in electrical experiment to verify principles of Kirchhoff's law to verify passive elements of electrical circuit
	Operate optical instruments to illustrate physical properties of light and to observe spectral lines of light to verify medium specific characteristics. Calculate Rydberg constant by studying Hydrogen spectrum to visualize visible spectra and to assess this empirical fitting parameter as a fundamental physical constant
	Determine Band Gap and Hall coefficient of a given intrinsic semiconductor and distinguish between different intrinsic semiconductors. Determine the dielectric constant of different capacitors to correlate their usage like insulator and limitation of their usage as a dielectric material.
	Apply concepts of quantum mechanics to verify Bohr's atomic orbital theory
	Determine Planck's constant and Stefan's constant applying modern Physics

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Basic Science & Humanities Department
H. E. T. C., Hooghly.

Course Outcome (CO) for Electronics and Communications Engineering Department

Physics – I (BS PH 101/201)	Apply basic concepts of mechanics
	Discuss Physical optics and analyze principles of lasers with applications
	Categorize di electric and magnetic properties of materials leading to Electromagnetic laws
	Differentiate between Classical Physics and Quantum Physics by introducing Planck's law
	Apply wave particle duality in real life problems followed by simple quantum mechanics calculations
	Classify ensembles and differentiate between classical and Quantum statistical mechanics

Ghosh
29/7/18

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Hooghly

A. Ghosh
27.7.18
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HOOGHLY ENGINEERING AND TECHNOLOGY COLLEGE

COURSE (SUB) OUTCOME

Course (Sub)Title : Chemistry – I		
Course (Sub)Code : BS-CH 201	Stream : ME	Semester: 2nd

Course (Sub) Outcomes

CO No.	CO
1	Analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2	Rationalize bulk properties and processes using thermodynamic considerations.
3	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
4	Rationalize periodic properties such as ionization potential, electronegativity and oxidation states.
5	List of major chemical reactions that are used in synthesis of molecules.

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H. E. T. C., Hooghly.

HOOGHLY ENGINEERING AND TECHNOLOGY COLLEGE

COURSE (SUB) OUTCOME

Course (Sub)Title : Chemistry – I Laboratory		
Course (Sub)Code : BS-CH 291	Stream : ME	Semester: 2nd
Course (Sub) Outcomes		
CO No.	CO	
1	On completion of this course students will be able to investigate different properties of metals.	
2	On completion of this course students will be able to analyze the different components of soil which is require for understanding soil mechanism.	
3	On completion of this course students will be able to analyze different parameters of drinking and sewage water.	
4	On completion of this course students will be able to handle different types of new gadgets which they normally practice in the laboratory.	
5	On completion of this course students will be able to develop efficiency in data analysis which is normally require for getting desirable result in different experiments.	

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Basic Science & Humanities Department
H. E. T. C., Hooghly.

COURSE OUTCOME

Paper Name	Paper Code	Course	Course Outcome
Mathematics IB	BS-M102	ME (1st year, 1st semester)	1. Apply the concept and techniques of differential and integral calculus to determine curvature and evaluation of different types of improper integrals 2. Understand the domain of applications of mean value theorems to engineering problems 3. Learn the tools of power series and Fourier series to analyse engineering problems and apply the concept of convergence of infinite series in many approximation techniques in engineering disciplines 4. Apply the knowledge for addressing the real-life problems which comprises of several variables or attributes and identify extremum points of different surfaces of higher dimensions 5. Understand different types of matrices, their Eigen values, Eigen vectors, rank and their orthogonal transformations which are essential for understanding physical and engineering problems

P. Debnath 25.7.18
H. O. D.
Basic Science & Humanities Department
H. E. T. C., Hooghly.

COURSE OUTCOME

Paper Name	Paper Code	Course	Course Outcome
Mathematics III	BS-M301	ME (2nd year, 3rd semester)	1. To introduce the solution methodologies for second order Partial Differential Equations with applications in engineering 2. To provide an overview of probability and statistics to engineers 3. The students will learn the basic ideas of statistics including measures of central tendency, regression 4. The students will learn the statistical methods of studying data samples

R. Patra
04/07/2019

Mukherjee 04/07/2019

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Basic Science & Humanities Department
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COURSE OUTCOME

Paper Name	Paper Code	Course	Course Outcome
Mathematics IIB	BS-M202	ME (1st year, 2nd semester)	1. Learn the methods for evaluating multiple integrals and their applications to different physical problems 2. Understand different techniques to solve first and second order ordinary differential equations with its formulation to address the modelling of systems and problems of engineering sciences 3. Learn different tools of differentiation and integration of functions of a complex variable that are used with various other techniques for solving engineering problems 4. Apply different types of transformations between two 2- dimensional planes for analysis of physical or engineering problems

R. Patra
02/01/2019

Mukherjee 02/01/2019
H. O. D.
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H. E. T. C., Hooghly.

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2/1/19

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2.1.19

COURSE OUTCOME

Paper Name	Paper Code	Course	Course Outcome
Humanities II (Operations Research)	HM-HU601	ME (3rd year, 6th semester)	1. Understand the importance of Operations Research and linear programming in solving practical problems in real life and interpret the transportation models' and assignment problems and apply solutions to the real-world problems 2. Know when replacement theory and queuing theory can be applied in real world problems 3. Apply forecasting methods for predicting demands and make decisions under certainty, uncertainty and conflicting situations 4. Apply linear programming tools for optimal utilization of resources in various types of industries 5. Solve transportation problems to minimize cost and understand the principles of assignment 6. Manage and analyze a project

AMukherjee 12/04/2021

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S. Debnath 12.4.2021

COURSE OUTCOME

Paper Name	Paper Code	Course	Course Outcome
Mathematics	M 402	ME (2nd year, 4th semester)	1. Applicable in the field of physics, EMT, transmission line, instrumentation in order to check accuracy, precision, error 2. Apply the properties of special functions to evaluate integral. Sketch the curve with full justification 3. Apply the knowledge of mathematics to the solution of complex engineering problems 4. Solve higher order linear differential equations and apply to modeling and analyzing mass spring systems 5. Solve system of linear equations using direct and iterative numerical techniques and develop solutions to ordinary differential equations using single step and multistep methods applied to structural systems

R. Patra
02/01/2019

Mukherjee 02/01/2019

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2/1/19

A Debnath
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COURSE OUTCOME

Paper Name	Paper Code	Course	Course Outcome
Numerical Methods	M(CS) 401	ME (2nd year, 4th semester)	1. Ability to tackle problems where analytical methods are difficult or fail 2. Competency to use numerical methods where analytical solutions are not amenable to numerical interpretation 3. Efficiency in formulation of numerical algorithms in iteration problems 4. Competency to tackle transcendental equations and boundary value differential equations with variable coefficients 5. Excellence use of numerical methods for approximate value of integration and forecasting of data

R. Patra
02/01/2019

Mukherjee 02/01/2019
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Banjee
2/1/19

Course Outcome (CO) for Mechanical Engineering Department

Physics –II Laboratory (PH 391)	Convert units by using conversion factors, unit analysis and calculate instrumental error analysis.
	Explain the difference between tensile stress and shear stress
	Find the modulus of elasticity of a material
	Apply the basic laws of physics in different aspects of physical world.
	Classify different characteristics of light

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H. E. T. C., Hooghly.

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Course Outcome (CO) for Mechanical Engineering Department

Physics – I (BS PH 101/201)	Apply basic concepts of mechanics
	Discuss Physical optics and analyze principles of lasers with applications
	Categorize di electric and magnetic properties of materials leading to Electromagnetic laws
	Differentiate between Classical Physics and Quantum Physics by introducing Planck's law
	Apply wave particle duality in real life problems followed by simple quantum mechanics calculations
	Classify ensembles and differentiate between classical and Quantumstatistical mechanics

27/7/18

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Course Outcome (CO) for Mechanical Engineering Department

Physics – II (PH 301/401)	Apply knowledge of quantum mechanics to analyze and interpret data of nanoscale electronic devices
	Apply knowledge on crystal structure gives enormous information about the active material of different electronic devices
	Apply knowledge of optics which is very useful to characterize the surface, to identify the inner structure of atoms for the fabrication of high-performance devices
	Apply the principles of Acoustics to design a system, component, or process to meet desired needs within realistic constraints

H. O. D.
Basic Science & Humanities Department
H. E. T. C., Hooghly.

Course Outcome (CO) for Mechanical Engineering Department

Physics –I Lab (BS PH191/291)	Observe and read data in slide calliper's, screw gauge. Calculate different modulus of elasticity to apply basic knowledge Physics of Elasticity and apply viscosity principle of streamline motion of water to calculate its viscosity coefficient required in fluid mechanics
	Arrange sequential connection in electrical experiment to verify principles of Kirchhoff's law to verify passive elements of electrical circuit
	Operate optical instruments to illustrate physical properties of light and to observe spectral lines of light to verify medium specific characteristics. Calculate Rydberg constant by studying Hydrogen spectrum to visualize visible spectra and to assess this empirical fitting parameter as a fundamental physical constant
	Determine Band Gap and Hall coefficient of a given intrinsic semiconductor and distinguish between different intrinsic semiconductors. Determine the dielectric constant of different capacitors to correlate their usage like insulator and limitation of their usage as a dielectric material.
	Apply concepts of quantum mechanics to verify Bohr's atomic orbital theory
	Determine Planck's constant and Stefan's constant applying modern Physics

H.O.D.
27/7/18

H. 26.7.18
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H. E. T. C~ Hooghly.