Hooghly Engineering & Technology College

Course Outcome

Electrical Engineering Department

COURSE OUTCOME

Paper Name	Paper Code	Course	Course Outcome
Mathematics IB	BS-M102	EE (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

Banjee
25/7/18

P. Debnath
25.7.18

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	EE (2nd year, 3rd semester)	1. To provide understanding of Probability required for an Electrical Engineer to apply in the profession 2. To understand different numerical methods required to solve numerically different systems 3. Excellence use of numerical methods for approximate value of integration and forecasting of data 4. To understand Z transform to be applied to solve problem of different discrete systems

Mukherjee 04/07/2019

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R. Patri
04/07/2019

COURSE OUTCOME

Paper Name	Paper Code	Course	Course Outcome
Mathematics IIB	BS-M202	EE (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

Mukherjee 02/01/2019
H. O. D.
Basic Science & Humanities Department
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2/1/19
P. Debnath 2.1.19

COURSE OUTCOME

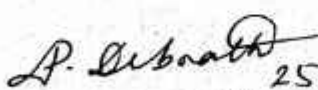| Paper Name	Paper Code	Course	Course Outcome
Numerical Methods	M(CS) 301	EE (2nd year, 3rd semester)	1. Ability to tackle problems where analytical methods are difficult or fail 2. Competency to use numerical methods where analytical solutions are not amenable to numerical interpretation 3. Efficiency 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

P. Debnath
25.7.18

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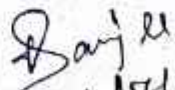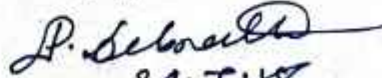H. E. T. C., Hooghly.

R. Patra
24/07/2018

COURSE OUTCOME

Paper Name	Paper Code	Course	Course Outcome
Mathematics	M 302	EE (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

P. Debnath 25.7.18
H. O. D.
Basic Science & Humanities Department
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R. Patre
24/07/2018

Banju
24/7/18

P. Debnath
24.7.18

Course Outcome (CO) for Electrical 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

Ghosh
27/7/18

A. ....
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Course Outcome (CO) for Electrical 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

Ghosh
27/7/18

B. Debnath
27.7.18

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Course Outcome (CO) for Electrical Engineering Department

Physics – II (PH(EE) 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

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A. Deborah
27.7.18

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Course Outcome (CO) for Electrical Engineering Department

Physics –II Laboratory (PH(EE) 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

Blurb
27/7/18

A. debnath
27.7.18

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HOOGHLY ENGINEERING AND TECHNOLOGY COLLEGE

COURSE (SUB) OUTCOME

Course (Sub)Title : ELECTRIC DRIVE

Course (Sub)Code : PC-EE 701   **Stream :EE**   **Semester: 7th**

Course (Sub) Outcomes

CO No.	CO
	After successful completion of this course, the students will be able to
1	Explain the principle of operation of Electric Drive.
2	Describe different methods of starting and braking of Electric Drive.
3	Model and control DC Drive
4	Control speed of Induction and Synchronous motors.
5	Recommend drives for different applications.
6	Estimate ratings, variables and parameters of Electric Drives.

HOOGHLY ENGINEERING AND TECHNOLOGY COLLEGE

COURSE (SUB) OUTCOME

Course (Sub)Title : **ELECTRIC DRIVE LABORATORY**

Course (Sub)Code : **PC-EE 791**   **Stream :EE**   **Semester: 7th**

Course (Sub) Outcomes

CO No.	CO
	After successful completion of this course, the students will be able to
1	Identify appropriate equipment and instruments for the experiment.
2	Test the instrument for application to the experiment.
3	Construct circuits with appropriate instruments and safety precautions.
4	Apply different methods of control of Electric Drive in the laboratory.
5	Analyze experimental data obtained in the laboratory.
6	Work effectively in a team

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PAPER NAME: CONTROL SYSTEM II LAB
CODE : EE 691

Contacts : 3P
Credits : 2

Course Outcome

EE691.1: Student will be able to perform experiments on nonlinearity.

EE691.2: Student will be able to take initiative to identify, formulate and analyze problems regarding

lead-lag compensation, state variable analysis using simulation tools.

EE691.3: Student will be able to write report on the performed experiment.

EE691.4: Student will be able to perform the experiment effectively as an individual using MATLAB and hardware equipment.

EE691.5: Student will be able to provide meaningful solutions by applying knowledge acquired in non linear control system.

EE691.6: Student will be able to function as a member or leader in team regularly.

NAME OF THE COURSE: CONTROL SYSTEM LABORATORY

COURSE CODE: PC-EE 593

SEMESTER: 5TH

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

1. Identify appropriate equipment and instruments for the experiment.

2. Test the instrument for application to the experiment.

3. Construct circuits with appropriate instruments and safety precautions.

4. Use MAT-Lab control system tool box, MAT-Lab- simulink tool box & PSPICE for simulation of Systems.

5. Determine control system specifications of first and second order systems.

6. Validate step response & impulse response for type-0, type-1 & Type-2 system with unity Feedback using MATLAB & PSPICE.

7. Work effectively in a team

Name of the Courses & Course Code	Course Outcomes	
	Course Outcome with Course Code	Description At the end of the course the students will be able to....
POWER SYSTEM-I PC-EE-502	PC-EE-502.CO1	To understand the basic principle of generation of Electricity from different sources
	PC-EE-502.CO2	To find parameters and characteristics of overhead transmission lines and cables.
	PC-EE-502.CO3	To find different parameters for the construction of overhead transmission line
	PC-EE-502.CO4	To determine the performance of transmission lines.
	PC-EE-502.CO5	To understand the principle tariff calculation.
	PC-EE-502.CO6	To solve numerical problems on the topics studied.
POWER SYSTEM-II PC-EE-601	PC-EE-601.CO1	To understand the method of representation of power system components
	PC-EE-601.CO2	To know about loacation and components of a distribution substation.
	PC-EE-601.CO3	To understand different methods of load flow studies.
	PC-EE-601.CO4	To determine faults in Electrical systems.
	PC-EE-601.CO5	To understand the principle of power system stability.
	PC-EE-601.CO6	To understand the principle of relays and methods of protection of power system.
	PC-EE-601.CO7	To solve numerical problems on the topics studied.
ELECTRO MAGNETIC FIELD THEORY PC-EE 303	PC-EE-303.CO1	To understand the basic mathematical tools to deal with Electromagnetic field Problem.
	PC-EE-303.CO2	To understand properties and application of Electric and magnetic field.
	PC-EE-303.CO3	To analyze electromagnetic wave propagation
	PC-EE-303.CO4	To solve problem related to Electromagnetic field.

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Name of the course: **Industrial Electrical Systems**

Course Code: **PE-EE-602C**

Course Outcome:

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

- *Represent electrical wiring system for residential, commercial and industrial consumers.*

- *Determine the rating of components of residential and commercial electrical systems.*

- *Design lighting scheme for a residential and commercial premises.*

- *Select transformer, switchgear, protection equipment for industrial electrical systems.*

- *Explain methods of automation of Industrial Electrical Systems*

- *Solve numerical problems related to earthing system, lighting system, power factor correction.*

Subject:LINE COMMUTATED AND ACTIVE PWM RECTIFIERS

Code:(PE-EE 801A)

Course Outcome(CO):

1. Explain the principle of operation of different converters.

2. Suggest the application of different converters and filters.

3. Apply converters for different applications.

4. Analyze converter circuits.

5. Develop appropriate scheme for control of different converters.

6. Solve numerical problems relating to different converters.

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Subject:POWER ELECTRONICS

Code:(PC-EE-504)

Course Outcome(CO):

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

1. Differentiate between signal level and power level devices.

2. Construct triggering and commutation circuits of SCR.

3. Explain the principle of operation of AC-DC, DC-DC and DC-AC converters.

4. Analyse the performance of AC-DC, DC-DC and DC-AC converters.

5. Apply methods of voltage control and harmonic reduction to inverters.

6. Solve numerical problems of switching devices, AC-DC, DC-DC and DC-AC converters.

Subject: ELECTRIC CIRCUIT THEORY
Code: PC-EE 301

Course Outcome (CO):

1. Describe different type of networks, sources and signals with examples.
2. Explain different network theorems, coupled circuit and tools for solution of networks.
3. Apply network theorems and different tools to solve network problem
4. Select suitable techniques of network analysis for efficient soluti
5. Estimate parameters of two-port networks.
6. Design filter circuits.

Subject: ELECTRIC CIRCUIT THEORY LABORATORY
Code: PC-EE 391

Course Outcome (CO):

1. Determine
   - transient response of different electrical circuit
   - parameters of two port network
   - frequency response of filters.
   - Laplace transform and inverse Laplace transform
2. Generate different signals in both discrete and analog form
3. Analyze amplitude and phase spectrum of different signals.
4. Verify network theorems.
5. Construct circuits with appropriate instruments and safety precautions
6. Simulate electrical circuit experiments using suitable software.

Subject: ELECTROMAGNETIC FIELD THEORY
Code: PC-EE 303

Course Outcome (CO):

1. Relate different coordinate systems for efficient solution of electromagnetic problems.
2. Describe mathematical s tools to solve electromagnetic problems.
3. Explain laws applied to electromagnetic field.
4. Apply mathematical tools and laws to solve electromagnetic problems.
5. Analyze electromagnetic wave propagation.
6. Estimate transmission line parameters.

HOOGHLY ENGINEERING AND TECHNOLOGY COLLEGE

COURSE OUTCOME

Control system I lab		
Course (Sub)Code : EE593	**Stream :EE**	**Semester: 5th**
Course Outcomes		
CO No.	**CO**	
At the end of the course student will have ability to		
1	Development of the knowledge for different use of MAT-Lab control system tool box.	
2	Determine different time domain specification parameters and develop transfer function for given control system problems.	
3	Determination of Root locus, Bode plot, Nyquist plot using MATLAB control system tool box &approximation of transfer functions experimentally from Bode plot.	
4	design PI, PD and PID controllers for given control system model	

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Electrical Machine lab I

Code: EE 491

CO

1. Estimate the performance parameters of DC machine.

2. Analyse the characteristics of DC machine

3. Apply speed control techniques in DC motor

4. Determine the equivalent circuit parameters and estimate the efficiency of a single phase transformer.

5. Test for the parallel operation of transformer.

6. Inspect the connection for different vector groups of three phase transformer

Electrical Machine lab II

Code: EE 591

CO

1. Develop the characteristics of synchronous and Induction generator

2. Determine the characteristics and parameters of three phase induction motor and Synchronous Motor

3. Decide the appropriate method of starting and speed control of three phase induction motor

4. Estimate the voltage regulation and elaborate the parallel operation of synchronous generator

5. Explain the performance of single phase induction motor under load condition

6. Evaluate the losses and parameters of single phase induction motor. phase transformer.

Subject: INDUSTRIAL AUTOMATION AND CONTROL
Code: PE-EE 801D

Course Outcome (CO):

1. Explain the basic structure of industrial automation and control.
2. Classify different types of control actions of controllers.
3. Analyze control strategies of different processes of industry.
4. Illustrate the construction and use of different types of actuators and control valves.
5. Use PLC, DCS and SCADA in advanced industrial control.

Subject: ELECTRICAL & ELECTRONICS MEASUREMENTS
Code: PC-EE-403

Course Outcome (CO):

1. Explain the terms accuracy, precision, resolution, speed of response, errors in measurement, loading effect.
2. Describe methods of measurement of power, energy by instruments and resistance, capacitance and inductance by bridges and potentiometer
3. Explain the principle of operation of analog meters, instrument transformer, digital multimeter, digital voltmeter, digital frequency meter, signal generator, strain gauge, LVDT and temperature transducers.
4. Explain the different building blocks, principle of operation of oscilloscope and measurement techniques of voltage, current, frequency and phase by oscilloscope.
5. Solve numerical problems related to analog meters, instrument transformer, measurement of power, energy, resistance, inductance and capacitance.
6. Specify applications of analog and digital measuring instruments, sensors and transducers

Subject: ELECTRICAL & ELECTRONICS MEASUREMENT LABORATORY
Code: PC-EE-493

Course Outcome (CO):

1. Identify appropriate equipment and instruments for the experiment.
2. Test the instrument for application to the experiment.
3. Construct circuits with appropriate instruments and safety precautions.
4. Evaluate and adjust the precision and accuracy of AC energy meter, moving iron and dynamometer type ammeter, voltmeter and wattmeter by potentiometer.
5. Measure voltage, current, power, energy, phase, frequency, resistance, inductance, capacitance
6. Work effectively in a team.

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NAME OF THE COURSE: POWER ELECTRONICS LABORATORY

COURSE CODE: PC-EE 594

SEMESTER: 5TH

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

1. Identify appropriate equipment and instruments for the experiment.

2. Test the instrument for application to the experiment.

3. Construct circuits with appropriate instruments and safety precautions.

4. Validate characteristics of SCR, Triac, and performance of phase controlled converter, DC-DC

Converter, inverters, and resonant pulse converters.

5. Demonstrate the relation between the speed and firing angle of Universal motor.

6. Work effectively in a team.

COURSE NAME: POWER ELECTRONICS LABORATORY

COURSE CODE: EE693

Course Outcomes:

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

1. Identify relevant information to supplement to the Power Electronics (EE603) course.

2. Set up testing strategies and select proper instruments to evaluate performance characteristics of Power devices and power electronics circuits and analyze their operation under different loading conditions.

3. Practice different types of wiring and devices connections keeping in mind technical, economical, safety issues.

4. Realize the limitations of computer simulations for verification of circuit behavior apply these techniques to different power electronic circuits and evaluate possible causes of discrepancy in practical experimental observations in comparison to theory.

5. Prepare professional quality textual and graphical presentations of laboratory data and computational results, incorporating accepted data analysis and synthesis methods, mathematical software, and word-processing tools.

6. Primarily via team-based laboratory activities, students will demonstrate the ability to interact effectively on a social and interpersonal level with fellow students, and will demonstrate the ability to divide up and share task responsibilities to complete assignments.

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COURSE (SUB) OUTCOME

Course (Sub) Title: POWER GENERATION ECONOMICS		
Course (Sub) Code: PE-EE 701C	Stream: EE	Semester: 7th

	Course (Sub) Outcomes	
CO No.	**CO**	
	After successful completion of this course, the students will be able to	
1	Explain the different terms e.g. load factor etc. for economics of generation.	
2	Apply different types of tariffs for electricity pricing.	
3	Optimize the operation of power system with unit commitment.	
4	Determine generation levels such that the total cost of generation becomes minimum for a defined level of load.	
5	Determine the state of the system given by the voltage magnitudes and phase angles at all buses.	
6	Predict the power or energy needed to balance the supply and load demand at all the times.	

UTILIZATION OF ELECTRIC POWER (Course Code: PC-EE 801)

CO:

1. explain the fundamentals of illumination and different lighting schemes.

2. explain the fundamental of Electrolytic processes, Electric heating and Welding.

3. able to select appropriate lighting, heating and welding techniques for specific applications.

4. apply different electrolysis process for different applications.

5. explain the principle of different aspect of Electric traction and control of traction motor.

SENSORS AND TRANSDUCERS (Course Code: OE-EE 801D)

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

1. explain the basic principle of operation of Transducers and Sensors.

2. distinguish different sensors and transducers.

3. identify suitable transducer by comparing different industrial standards and procedures for measurement of physical parameters.

4. estimate the performance of different transducers.

5. design real life electronics and instrumentation measurement systems.

6. apply smart sensors, biosensors, PLC and Internet of Things to different applications.

Basic Electrical Engineering (Course Code : 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

HOOGHLY ENGINEERING AND TECHNOLOGY COLLEGE

COURSE (SUB) OUTCOME AND CO MAPPING

Course (Sub)Title: Control system			
Course (Sub)Code: PC- EE503		Stream: EE	Semester: 5th
Course (Sub) Outcomes			
CO No.	CO		
	After successful completion of this course, the students will be able to		
1	**Understand** the general concept of a system and classify systems into different types and represent a system using different techniques like block diagram, signal flow graph.		
2	**Develop** mathematical model for different physical systems like mechanical, electrical, thermal, fluid system and different control system components like servomotors, synchros, potentiometer, tacho-generators etc.		
3	**Determine** different time domain specification parameters and thus can apply that knowledge to conclude dynamic performance of a system.		
4	**Analyze** system's absolute, relative, local stability using different frequency domain methods like bode plot and nyquist and using routh-hurwitz (RH) criteria, root locus techniques in time domain.		
5	**Design** analog controllers, compensators and their selection to meet desired response.		
6	**Apply** state variable techniques for analysis of linear systems.		

1

Course Outcomes

Digital Signal Processing (OEEE601A)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to......
Digital Signal Processing (OEEE601A)	Represent signals mathematically in continuous and discrete-time and in the frequency domain.
	Analyze discrete-time systems using z-transform.
	Explain the Discrete-Fourier Transform (DFT) and the FFT algorithms.
	Design digital filters for various applications.
	Apply digital signal processing for the analysis of real-life signals.

Course Outcomes

Digital Signal Processing (ECEE-605A)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to......
Digital Signal	Represent signals mathematically in continuous and discrete-time and in the frequency domain.

Processing (ECEE-605A)	Analyze discrete-time systems using z-transform.
	Explain the Discrete-Fourier Transform (DFT) and the FFT algorithms.
	Design digital filters for various applications.
	Apply digital signal processing for the analysis of real-life signals.

Course Outcomes

Values & Ethics in Profession (HU-401)

Course Title And Course Code	Course Outcomes At the end of the course the students will be able to.....
Values & Ethics in Profession (HU-401)	Illustrate different aspects of human values, ethics, engineers' responsibility and duties
	Explain different principles, different theories and laws of engineering ethics and social experimentation
	Identify different factors in the light of Engineers' responsibility towards safety and risk
	Correlate ethics of different work environment.
	Explain the need for intellectual property rights.

Course Outcomes

Values & Ethics in Profession (HMEE-401)

2

Course Title And Course Code	Course Outcomes
	At the end of the course the students will be able to....—
Values & Ethics in Profession (HMEE-401)	Illustrate different aspects of human values, ethics, engineers' responsibility and duties
	Explain different principles, different theories and laws of engineering ethics and social experimentation
	Identify different factors in the light of Engineers' responsibility towards safety and risk
	Correlate ethics of different work environment.
	Explain the need for intellectual property rights.

Course Outcomes

Analog Electronic Circuits (EC-EE301)

Course Title And Course Code	Course Outcomes
	At the end of the course the students will be able to......
Analog Electronic Circuits (EC-EE301)	Describe analog electronic components and analog electronics circuits
	Explain principle of operation of analog electronic components, filters, regulators and analog electronic circuits.
	Compute parameters and operating points of analog electronic circuits
	Determine response of analog electronic circuits.
	Distinguish different types amplifier and different types oscillators based on application.
	Construct operational amplifier based circuits for different applications.

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3

Course Outcomes

Analog Electronics (PC-EE302)

Course Title And Course Code	Course Outcomes
	At the end of the course the students will be able to.....
Analog Electronics (PC-EE302)	Describe analog electronic components and analog electronics circuits
	Explain principle of operation of analog electronic components, filters, regulators and analog electronic circuits.
	Compute parameters and operating points of analog electronic circuits
	Determine response of analog electronic circuits.
	Distinguish different types amplifier and different types oscillators based on application.
	Construct operational amplifier based circuits for different applications.

Course Outcomes

Basic Electrical Engineering (ES-EE101)

Course Title And Course	Course Outcomes
	At the end of the course the students will be able to.....

COURSE OUTCOMES

Paper Name: DATA STRUCTURE & ALGORITHM

Department: Electrical Engineering

Semester: 5th

Paper Code: OE-EE-501A

After completion of this course students will be able to

OE-EE501A.CO1: Explain fundamentals of data structure.

OE-EE501A.CO2: Develop algorithm for linear data Structure like stack, queue and linked list.

OE-EE501A.CO3: Develop algorithm for non-linear data structure like trees and graphs.

OE-EE501A.CO4: Develop sorting, searching and hashing algorithms

OE-EE501A.CO5: Identify an appropriate data structure to solve a particular problem.

Coordinator, Department of Cator
Coordinator
Department of CSE

Mr. Dibyendu Samanta
Assistant Professor, Department of CSE

Electrical Engineering
Hooghly Engineering & Technology College

HOOGHLY ENGINEERING AND TECHNOLOGY COLLEGE

COURSE (SUB) OUTCOME

Course (Sub) Title: ECONOMICS FOR ENGINEERS

Course (Sub) Code:HM-EE601   **Stream: EE**   **Semester: 6th**

Course (Sub) Outcomes

CO No.	CO
	After successful completion of this course, the students will be able to
1	Evaluate the economic theories, cost concepts and pricing policies.
2	Explain the market structures and integration concepts.
3	Apply the concepts of financial management for project appraisal.
4	Explain accounting systems, the impact of inflation, taxation, depreciation.
5	Analyze financial statements using ratio analysis.
6	Explain financial planning, economic basis for replacement, project scheduling, legal and regulatory. issues applied to economic investment and project-management problems

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Electrical Engineering
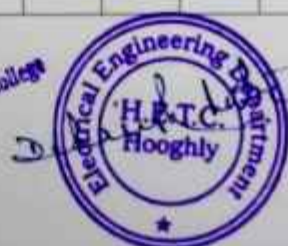Hooghly Engineering & Technology College

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HOOGHLY ENGINEERING AND TECHNOLOGY COLLEGE

PROGRAM OUTCOMES (PO) STATEMENTS:

1. **PO1 Engineering Knowledge:** To apply knowledge of mathematics, science, engineering fundamentals, problem solving skills, algorithmic analysis to solve complex engineering problems.
2. **PO2 Problem analysis:** To analyze the problem by finding its domain and applying domain specific skills.
3. **PO3 Design/development of solutions:** To understand the design issues of the product/software and develop effective solutions with appropriate consideration of public health and safety, cultural, societal, and environmental issues.
4. **PO4 Conduct investigations of complex problems:** To find solutions of complex problems by conducting investigations applying suitable techniques.
5. **PO5 Modern tool usage:** To adapt the usage of modern tools and recent software.
6. **PO6 The engineer and society:** To contribute towards the society by understanding the impact of Engineering on global aspect.
7. **PO7 Environment and sustainability:** To understand environment issues and design a sustainable system.
8. **PO8 Ethics:** To understand and follow professional ethics.
9. **PO9 Individual and team work:** To function effectively as an individual and as member or leader in diverse teams and interdisciplinary settings.
10. **PO10 Communication:** To demonstrate effective communication at various levels.
11. **PO11 Project Management and finance:** To apply the knowledge of Computer Engineering for development of projects, and its finance and management.
12. **PO12 Life-Long Learning:** To keep in touch with current technologies and inculcate the practices of lifelong learning.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√		√		√						√
CO2	√		√	√	√	√		√		√		√
CO3	√	√	√	√	√	√					√	√
CO4	√			√	√	√	√				√	√
CO5	√	√		√	√		√	√	√			√
CO6	√	√	√	√	√	√	√	√		√	√	√

HVDC _ Course Outcome:

1. After completion of this course, the learners will be able to choose intelligently AC and DC transmission systems for the dedicated application(s).

2. They will be able to identify the suitable two-level/multilevel configuration for high power converters.

3. Also, they will be able to select the suitable protection method for various converter faults.

4. They will be able to identify suitable reactive power compensation method.

5. The learners will be able to decide the configuration for harmonic mitigation on both AC and DC sides.

6. They will be able to solve numerical problems related to converters, power flow analysis, and reactive power control.

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Course Code: PC-EE-502
power Sysem 1

Course Outcome:

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

1. explain the principle of generation of Electric power from different sources

2. determine parameters of transmission lines and its performance

3. explain the principle of formation of corona and methods of its reduction

4. conduct electrical tests on insulators

5. solve numerical problems related to overhead transmission line, cable, insulators and tariff

6. analyze overhead transmission line based on short medium and long lines.

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COURSE (SUB) OUTCOME

Course (Sub)Title : ADVANCED ELECTRIC DRIVE

Course (Sub)Code : PE-EE 801C   Stream :EE   Semester: 8th

Course (Sub) Outcomes

CO No.	CO
	After successful completion of this course, the students will be able to
1	Explain the principle of operation of converters for AC drives.
2	Model Induction and Synchronous motor by reference frame theory.
3	Apply different control methods to control speed and torque of Induction and Synchronous motor.
4	Explain the configurations and method of speed control of BLDC, PMSM and SRM
5	Realize basic blocks for DSP based motion control.
6	Develop appropriate scheme for speed control of Induction and Synchronous motor.

Elec. Machine - II _ Course Outcome:

1. After completion of this course, the learners will be able to describe the arrangement of winding of AC machines.

2. They will be able to explain the principle of operation of Induction machines, Synchronous machines and special machines.

3. Also, they will be able to solve numerical problems of Induction machines, Synchronous machines and Special machines.

4. They will be able to estimate the parameters and efficiency of Induction machines and Synchronous machines.

5. The learners will be able to determine the characteristics of Induction machines and Synchronous machines.

6. They will be able to select appropriate methods for starting, braking and speed control of Induction machines.

Elec. Machine - 1 _ Course Outcome:

1. After completion of this course, the learners will be able to describe the function of different components of magnetic circuit, DC machines and transformers

2. They will be able to explain the principle of operation of different types of DC machines and transformers

3. Also, they will be able to solve numerical problems of DC machines and transformers.

4. They will be able to estimate the parameters and efficiency of transformer.

5. The learners will be able to determine the characteristics of DC machines

6. They will be able to recommend methods to control output of DC machines.

ANALOG ELECTRONICS (PC-EE 302)

CO

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

1. describe analog electronic components and analog electronics circuits.
2. explain principle of operation of analog electronic components, filters, regulators, and analog electronic circuits.
3. compute parameters and operating points of analog electronic circuits.
4. determine response of analog electronic circuits.
5. distinguish different types of amplifiers and different types of oscillators based on application.
6. construct operational amplifier-based circuits for different applications.

Analog electronic laboratory (PC-EE392)

CO

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

1. determine
   - characteristics of full wave rectifier with filter and without filter
   - characteristics of BJT and FET
   - characteristics of Zener diode as voltage regulator
   - characteristics of class A, C and push pull amplifiers
2. verify function of DAC and ADC
3. construct
   - function generator using IC.
   - R-C coupled amplifier.
   - linear voltage regulator using regulator IC chip.
   - timer circuit using 555 for monostable, astable and multistable multivibrator.
   - V to I and I to V converter with Op amps.

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DIGITAL ELECTRONICS (PC-EE-402)

CO

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

1. describe the function of different building blocks of digital electronics, semiconductor memories and programmable logic devices.
2. explain the principle of operation of combinational and sequential digital circuits, A/D and D/A converter compute parameters and operating points of analog electronic circuits.
3. solve numerical problems of Boolean algebra, number system, combinational & sequential digital circuits and A/D and D/A converter.
4. specify applications of combinational and sequential digital circuits.
5. determine specifications of different digital circuits.
6. design combinational and sequential digital circuits.

DIGITAL ELECTRONICS LABORATORY (PC-EE492)

CO

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

1. identify appropriate equipment and instruments for the experiment.
2. test the instruments for application to the experiment.
3. construct decoder, multiplexer, adder and subtractor circuits with appropriate instruments and precaution.
4. realize RS-JK and D flip flop, universal register with gates, multiplexer, and flip-flops and asynchronous and synchronous up down counters.
5. validate the operation of code conversion circuit –BCD to Excess 3 & vice versa, 4 bit parity generator & comparator circuits.
6. work effectively in a team.

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COURSE (SUB) OUTCOME

Course (Sub) Title: Control system II		
Course (Sub)Code : EE601	Stream : EE	Semester: 6th
Course (Sub) Outcomes		
CO No.	CO	
	After successful completion of this course, the students will be able to	
1	Infer the general concept of state variable, state space, nonlinear system, nonlinear characteristics, and sampled data system.	
2	Develop state space models of electrical, mechanical, thermal and fluid system and different control system components like servomotors etc.	
3	Acquires the knowledge of different types of nonlinear systems like practical relay, saturation, backlash and evaluate stability of nonlinear systems by describing function method, Lyapunov's method and phase plane technique	
4	Design state feedback gains using pole allocation method and digital compensator in frequency domain.	
5	Assess sampled data system and judge the issues faced in sampling, digital data and discrete time systems.	

RENEWABLE & NON CONVENTIONAL ENERGY (Course Code: PE-EE-501C)

1. explain the principle of conversion of solar energy, wind energy , biomass, Geothermal energy, Ocean energy and Hydrogen energy to other form of energy.
2. explain the principle of operation of magneto hydrodynamic power generation:
3. useSolar energy, Wind energy , Biomass, Geothermal energy, Ocean energy, Hydrogen energy and fuel cell for different applications.
4. suggest location to set up wind mill and biogas generation plant
5. estimate conversion efficiency of fuel cell.
6. solve numerical problems relating to conversion of Solar energy, Wind energy , Biomass, Ocean energy and Hydrogen energy to heat and electric energy

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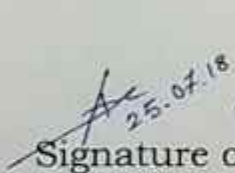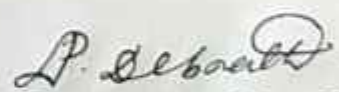Electrical Engineering
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COURSE (SUB) OUTCOME

Course (Sub)Title : Chemistry – I		
Course (Sub)Code : BS-CH 101	Stream : EE	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.

25.07.18   AMukherjee 25/07/18

Signature of the faculty

P. Deboath 25.7.18

Signature of the HOD

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COURSE (SUB) OUTCOME

Course (Sub)Title : Chemistry – I Laboratory

Course (Sub)Code : BS-CH 191   **Stream : EE**   **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

Signature of the faculty

P. Debnath 25.7.18

Signature of the HOD

H.O.D.
Basic Science & Humanities Department
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