NIT

JIS GROUP
Educational Initiatives

CURRICULUM ESSENTIALS

Department of Electrical Engineering

Departmental Mission

M1: To impart comprehensive and quality education to create innovative, entrepreneurial and ethical professionals for development of electrical technology in sustainable infrastructure.

M2: To develop a reservoir of experience and knowledge and to share it with the stake holders in education for mutual enrichment;

M3: To promote, product oriented and dedicated research for establishing a self-sustaining and wealth-creating centre to serve, the social needs;

M4: To prepare the students for new challenges in the field of electrical engineering;

M5: To create and sustain an environment, for critical thinking and problem solving;

M6: To strive to be at the forefront of Research and maintain intensive interaction with Industry and leading Research Centres, where students can be engaged in Projects, Training and Internships.

M7: To undertake collaborative projects which offer opportunities for long-term interaction with academia and industry.

M8: To develop intellectually capable and imaginative leaders to serve a broad spectrum of professions.

Departmental Vision

To create responsible electrical engineers who shall be trained with modern technology and tools and who would 'think global and act local' to become the change agents of society for developing sustainable green infrastructure.

Departmental Curriculum Structure

Srl No.	Paper Code	Theory	Contact Hours/week				Credit Points
			L	T	P	Total	
1	EE 101/ EE 201	Basic Electrical	3	1	0	4	4
2	CH101/ PH201	Chemistry /physics	3	1	0	4	4
3	EC101/EC201	Basic Electronics Engineering	3	1	0	4	4
4	HU101	Communicative English	2	0	0	2	2
5	ME101	Engineering Mechanics	3	1	0	4	4
6	M101	Mathematics-I	3	1	0	4	4
7	CS201	Computer fundamentals and principles	2	1	0	3	3

		of computer programming					
8	M201	Engineering mechanics	2	1	0	3	3
Practical							
1	EE191/EE192	Basic electrical engineering lab	0	0	3	3	4
2	CH191/PH291	Chemistry /physics Lab	0	0	3	3	2
3	EC191/EC291	Basic Electronics Engineering Lab	0	0	3	3	2
4	ME191/ME192	Engineering Drawing and graphics/ Workshop practice	0	0	3	3	2
5	HU191	Language Lab and seminar presentation	0	0	2	2	1
6	CS291	Computer fundamentals and principles of computer programming Lab	0	0	3	3	2
2nd year 1st Semester Theory							
1	EE301	Circuit Theory and Network	3	1	-	4	4

2	EE302	Field Theory	3	0	-	3	3
3	M301	Mathematics III	3	1	0	4	4
4	EC(EE)301	Digital Electronics	3	1	0	4	3
5	EC(EE)302	Analog Electronic Circuit	3	0	0	3	3
6	ME(EE)301	Thermal Power Engineering	0	0	2	2	1
Practical							
1	EE391	Circuit Theory and Network Lab	3	1	-	4	2
2	EC(EE)391	Analog and Digital Electronics Lab	0	0	3	3	2
3	ME(EE)391	Thermal Power Engineering Lab	0	0	2	2	1
4	HU381	Technical report writing and language practice	0	0	2	2	1
2nd Year 2nd Semester Theory							
1	EE402	Electrical and Electronics Measurement	3	0	-	3	3
2	EE401	Electrical Machine 1	3	1	-	4	4
	PH(EE)401	Physics II	3	0	0	3	3
	M(CS)401	Numerical Methods	3	0	0	3	3
	CS(	Data	3	0	0	3	3

	EE) 402	Structure					
Practical							
1	EE491	Electrical Machine 1 Lab	-	-	3	3	2
2	EE492	Electrical and Electronics Measurement Lab	-	-	3	3	2
3	PH(EE) 491	Physics II Lab	0	0	3	3	2
4	M(CS)491	Numerical Methods Lab	0	0	3	3	2
5	CS(EE) 492	Data Structure Lab	0	0	3	3	2
3rd Year 1st Semester							
Theory							
1	EE501	Electrical Machine II	3	1	-	4	4
2	EE502	Power System I	3	1	-	4	4
3	EE503	Control System I	3	1	-	4	4
4	EE504	Microprocessor and Microcontroller	0	0	2	2	1
5	HU501	Environmental Science	2	0	0	2	2
Practical							
1	EE591	Electrical Machine II Lab	0	0	3	3	2
2	EE592	Power System I Lab	0	0	3	3	2
3	EE593	Control System I Lab	0	0	3	3	2
4	EE581	Electrical System Design	0	1	3	4	2

3rd Year 2nd Semester							
1	EE601	Control System II	3	0	-	3	3
2	EE602	Power System II	3	0	-	3	3
3	EE603	Power Electronics	3	0	-	3	3
4	EE605	Non-Conventional Energy Sources and Applications	3	1	0	4	4
5	CS(EE)606	Computer Architecture and operating systems	3	0	0	3	3
6	EC(EE)604	Digital Signal Processing	3	0	0	3	3
Practical							
1	EE691	Control System II	0	0	3	3	2
2	EE692	Power System II	0	0	3	3	2
3	EE693	Power Electronics	0	0	3	3	2
4	EE681	Electrical System Design II	0	1	3	4	2
5	CS(EE)606	Elective II	0	0	2	2	1
6	EE671	Industrial Training	0	0	2	2	1
4th Year 1st Semester Theory							
1	EE701	Electric Drives	3	0	-	3	3
2	HU701	Organizational behavior Values and ethics	2	0	0	2	2

3	EE702	Elective III	3	1	0	4	4
4	EE703	Elective IV	3	1	0	4	4
5	CS(EE)705	Computer networking	3	0	0	3	3
Practical							
1	EE791	Electric Drives Lab	0	0	3	3	2
2	EE795	Elective V Lab	0	0	2	2	1
3	EE781	Assigned Project I	0	0	6	6	4
4	EE771	Seminar on Industrial Training & Report	0	0	0	0	1
5	MC781	Entrepreneurship Development	0	0	0	0	2
4^{th} Year 2^{nd} Semester Theory							
1	HU801	Industrial & Financial Management	2	0	0	2	2
2	EE801	Elective VI	3	1	0	4	4
3	EE802	Elective VII	3	0	0	3	3
4	EE881	Project & Thesis	0	0	12	12	6
5	EE871	Grand Viva	0	0	0	0	3

Program Educational Objectives (PEO)

PEO1. Objective 1 (Technical Knowledge) – To equip the students with the technology of electrical machines, power systems, power electronics, signals and systems, electrical networks and control systems so that they are able to carry out the design, construction, operation and maintenance of such machines and systems as required by the market.

PEO 2. Objective 2 (Technical Skills) – To train the students on fabrication, assembly, operation, maintenance of all kinds of electrical machines and systems such as motors, generators, transformers, circuit breakers, relays, power electronic converters and control circuits so that they are useful in any manufacturing or project environment.

PEO 3.Objective3(ICT Skills) – To involve the students in rigorous practice of programming languages such as C, C++, Java and train them with digital communication protocols and communication technologies so that they are able to develop suitable hardware and software interfaces to integrate various electrical and electronics equipment.

PEO 4. Objective 4 (Communication Skills) – To develop competence in written communications to orient

them how to write a letter to an official, prepare project documentation, write paper for a conference and to

develop competence in oral communications to orient them for their personality development, participating in seminars, interaction with corporate world etc.

PEO 5. Objective 5 (Professional Skills) – To train the students on profitability, accountability, values and ethics and balanced behaviour to ensure viability and usefulness of each and every service provided by them in a multidisciplinary environment.

PEO 6. Objective 6 (Social Awareness) – To make the students aware about the social concerns and professional responsibilities in the workplace.

PEO 7. Objective 7(Life-long Learning) – To motivate the students for continued professional training and adaptability to changes in the workplace through formal and informal education.

PEO 8. Objective 8 (Industry Orientation) - To provide the students with opportunities for vocational training, industry visits and give exposure to them with seminars by experienced industry personnel and arrange day-long open interactive sessions with industry persons. All these shall be done with an objective to make the students industry ready.

PEO 9. Objective 9 (Higher Study and Research) – To create opportunities for the students to work in minor

and major projects and arrange presentation of the projects to eminent academicians and industry professionals and to encourage participation of these projects in national and international competitions. All these shall be done to prepare and motivate the students to go for higher studies and research.

Program Outcome (PO)

PO1. Graduates will be demonstrating basic knowledge in mathematics, science and engineering.
PO2. Graduates will be demonstrating the ability to design and conduct experiments, interpret and analyse data, and report results.
PO3. Graduates will be demonstrating the ability to design an electrical system or a process that meets desired specifications and requirements.
PO4. Graduates will be demonstrating the ability to function on engineering and science laboratory teams, as well as on multidisciplinary design teams.
PO5. Graduates will be demonstrating the ability to identify, formulate and solve electrical engineering problems.
PO6. Graduates will be demonstrating an understanding of their professional and ethical responsibilities.
PO7. Graduates will be able to communicate effectively in both verbal and written forms.
PO8. Graduates will have the confidence to apply engineering solutions in global and societal contexts.

PO9. Graduates should be capable of self-education and clearly understand the value of lifelong learning which motivate them for higher education also.
PO10. Graduates will be broadly educated and will have an understanding of the impact of engineering on society and demonstrate awareness of contemporary issues.
PO11. Graduates will be familiar with modern engineering software tools and equipment to analyse electrical engineering problems.

Programme Specific Outcome (PSO)

PSO 1: To position the students in a leading managerial role in industry
PSO 2: To establish as a viable entrepreneur and create multiple job opportunities for others.
PSO 3: To establish as an academician and train the talents for the future
PSO 4: To avail opportunities in higher studies and research

Course Outcome (CO)

1st Year 1st Semester & 2nd Semester

EE101: Basic Electrical Engineering

EE101.1: Students will be able to understand Kirchhoff's Laws, Ohm's Law and how to apply them in Mesh and loop analysis methods. They will be able to understand the concept of linearity, Superposition and Network Theorems.
EE101.2: Students will be able to understand circuit analysis involving capacitors, inductors
EE101.3: Students will be able to understand AC fundamentals among the students.
EE101.4: To predict the behaviour of any electrical and magnetic circuits.
EE101.5: To explain the working principle, construction, applications of DC machines, AC machines & measuring instruments.
EE101.6: To wire basic electrical circuit depending upon the requirement.

PH201/101 :Physics I

Student should be

PH201.1: Able to explain the different types of vibrations.
PH201.2: Able to apply the laser principles to holography
PH201.3: Able to analyse the problems of black body radiation.

PH201.4: Able to evaluate X-ray in different experiments/processes.

CH201/101: Chemistry

CH101.1: Able to apply fundamental concepts of thermodynamics in different engineering applications.
CH101.2: Able to analyze & design simple and technologically advance electrical and energy storage devices.
CH101.3: Able to prepare composites, Synthetic polymers, etc.
CH101.4: Able to apply the knowledge of chemical reactions to industries and scientific and technical fields.
CH101.5: Able to apply the knowledge of corrosion to prevent corrosion in different industries
CH101.6: Capable to evaluate theoretical and practical aspects relating to the transfer of the production of chemical products from laboratories to the industrial scale, in accordance with environmental considerations.

EC(EE)201: Basic Electronics

EC(EE)201.1: Able to identify semiconductor materials, draw energy band diagram, distinguish between intrinsic and extrinsic semiconductor, calculate drift and diffusion current component.
EC(EE)201.2: Able to characterize semiconductors, diodes, transistors and operational amplifiers.
EC(EE)201.3: Able to know the application of Diode, BJT & OPAMP
EC(EE)201.4: Able to identify functions of digital Multimeter, cathode ray

oscilloscope and transducers in the measurement of physical variables.

CS(EE)201: Computer fundamentals and principles of computer programming

CS(EE)201.1: Define, identify and discuss the basic components of a computer system, functional units of a computer system.
CS(EE)201.2: Define and distinguish Hardware and Software components of computer system, primary and secondary memory, various input and output units and explain their purposes.
CS(EE)201.3: Apply basic language constructs of C, including data types, expressions, control structures and arrays.
CS(EE)201.4: Explain control flow including selection, iteration and function calls and choose appropriate conditional and iteration constructs for a given programming task.
CS(EE)201.5: Design programs that use compound data types: array, structs, strings and Understand dynamic memory allocation and static memory allocation
CS(EE)201.6: Describe various simple problem solving techniques and apply basic programming, debugging and troubleshooting skills.

HU101: Business Communication
HU101.1: To acquire proficiency in speaking grammatically correct English
HU101.2: To enhance their perception in comprehending English passages.
HU101.3: To develop their writing skills in business communication.
HU101.4: To get that accuracy in solving English Aptitude Questions.

HU101.5: To make them Industry Ready to accept challenges in their professional life.

ME 101: Engineering Mechanics

ME 101.1: Determine the resultant force and moment for a given force system.
ME 101.2: Analyse planar and spatial systems to determine the forces in members of trusses, frames and problems related to friction.
ME 101.3: Calculate the motion parameters for a body subjected to a given force system.
ME 101.4: Determine the deformation of a shaft and understand the relationship between material constants.
ME 101.5: Determine the centroid and second moment of area.

M101: Engineering Mathematics I

M101.1: Able to explain the applicability of determinant and matrix in the different types of engineering problem.
M101.2: Able to apply Mean value theorems & expansion of function in engineering field.
M101.3: Able to apply the area & volume integrals in different engineering problems.
M101.4: Able to apply vector concepts in numerous engineering experiments and problems.
M101.5: Application of improper integral in engineering field.

EE191: Basic Electrical Lab

EE101.1: Students will be able to understand Kirchhoff's Laws, Ohm's Law and how to apply them in mesh and nodal analysis methods.
EE101.2: They will be able to understand the concept of linearity, Superposition and how to use the same for solving problems on circuit . They should be able to apply Thevenin's and Norton's Theorem.
EE101.3: Students will be able to identify components of basic electrical engineering lab and write report on performed experiments on AC and DC circuits.
EE101.4: Students will be able to explain the characteristics of various components and machines used in Electrical Engineering.
EE101.5: Students will be able to initiative in preparing an electrical circuit and explain the working principle of the circuit.
EE101.6: Students will be able to work in team of basic electrical engineering lab on regular basis and develop proficiency in analysing electrical circuits.

PH191/291 :Physics-1 Lab

PH291.1: Able to understand deformation in materials due to stress.
PH291.2: Able to analyse electrical circuits using wheat stone bridge.
PH291.3: Able to demonstrate the formation of fringes due to interference phenomenon of light.
PH291.4: Able to measure energy loss in fibre optic cable.

CH191/291: Chemistry Lab

CH191.1: Able to analyse different parameters of water considering environmental issues.
CH191.2: Able to work as an individual also as an team member
CH191.3: Able to synthesize nano and polymer materials.
CH191.4: Capable to design innovative experiments applying the fundamentals of chemistry

EC191/291: Basic Electronics

EC191/291.1: Knowledge of Electronic components such as Resistors, Capacitors, Diodes, Transistors measuring equipment like DC power supply, Multimeter, CRO, Signal generator, DC power supply
EC191/291.2: Analyze the characteristics of Junction Diode, Zener Diode, BJT & FET and different types of Rectifier Circuits.
EC191/291.3: Determination of input-offset voltage, input bias current and Slew rate, Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs
EC191/291.4: Able to know the application of Diode, BJT & OPAMP.

ME191/291: Engineering Drawing & Graphics

ME191.1: Draw orthographic projections of lines, planes and solids.
ME191.2: Construct isometric scale, isometric projections and views.
ME191.3: Draw sections of solids including cylinders, cones, prisms and pyramids.
ME191.4: Draw projections of lines, planes, solids, isometric projections and sections of solids including cylinders, cones, prisms and pyramids using AutoCAD.

ME191/291: Workshop Practice

ME191/291.1: Study and practice on machine tools and their operations
ME191/291.2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding
ME191/291.3: Identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping
ME191/291.4: Apply basic electrical engineering knowledge for house wiring practice

CS(EE)291: Computer fundamentals and principles of computer programming Lab

CS(EE)291.1: Read, understand and trace the execution of programs written in C language.
CS(EE)291.2: Write the C code for a given algorithm.
CS(EE)291.3: Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
CS(EE)291.4: Write programs that perform operations using derived data types.

HU181: Language Lab and seminar presentation

HU181.1: To be efficient in using basic grammar of English Language.
HU181.2: To be able to read and comprehend any given passage in English.
HU181.3: Build confidence in speaking, reading and writing English professionally.
HU181.4: Understanding communication techniques and learning the method of technical writing.
HU181.5: To be able to employ writing skills proficiently
HU181.6: To be prompt in speaking/presenting spontaneously on given subjects.

M201: Engineering Mathematics II

M201.1: Able to apply the knowledge of first order differentiation in engineering field.
M201.2: Able to analyse type of higher order equations and apply in numerous engineering application.
M201.3: Able to analyze graph theory concepts in explaining the behavior of electrical, communication and electromagnetic field.
M201.4: Able for application of Laplace Transform for solving various engineering problems.

2nd Year 3rd Semester

EE301: Circuit Theory and Network

EE301.1: Student will be able to understand the fundamentals of different circuit components.
EE301.2: Student will be able to understand the difference between independent sources and dependent sources.
EE301.3: Student will be able to form network equations with loop and node analysis.
EE301.4: Student will be able to build concepts on Transients and solve problems using Laplace Transform.
EE301.4: Student will be able to build concepts on Transients and solve problems using Laplace Transform.
EE301.6: Students will be able to explain ABCD Parameters and hybrid parameters which will be essential in future for transmission line analysis and transistor modelling in practical field.

EE302: Field Theory

EE302.1: Student will be able to understand the physical meanings of divergence and curl
EE302.2: Student will be able to explain the Maxwell's equations for steady fields and time varying field.
EE302.3: Student will be able to apply and correlate the Pointing vector and Pointing theorem.
EE302.4: Student will be able to understand the thorough treatment of the theory of electro dynamics, mainly from a

classical field theoretical point of view, and includes such things as electrostatics and magneto-statics

EE302.5: Student will be able to estimate force due to current carrying conductors and interrelationship with magnetic field.

EE302.6: Student will be able to explain electromagnetic theory and explains universal concepts in three-dimension real world, i.e., electro-magnetic wave propagation in free-space.

M301: Mathematics III

M301.1: Able to apply the knowledge of Fourier series and transform in engineering problems like finding the frequency of wave propagation.

M301.2: Able to apply the knowledge of Complex Analysis viz the Cauchy Residue Theorem to evaluate integrals and sum series.

M301.3: Able to solve the stochastic model of engineering problems using the idea of different kind of enginnering problems .

M301.4: Able to know that differential equation is a very important mathematical model of many problems in the application of engineering and also be able to utilize theories and methods learned in the course to analyze and solve a differential equation.

EC(EE)301: Digital Electronics

EC(EE)301.1: Able to understand number systems conversions and Boolean algebra and design logic circuits using logic gates to their simplest forms using DeMorgan's Theorems; Karnaugh Maps.

EC(EE)301.2: Able to design & analyze combinational logic circuits.
EC(EE)301.3: Able to design and analyze of various synchronous and asynchronous sequential circuits using State Diagrams & Tables.
EC(EE)301.4: Able to understand Digital To Analog Conversion, Analog To Digital Conversion technique and corresponding circuits.
EC(EE)301.5: Able to Analyze logic family interfaces, switching circuits to Plan and execute projects.

EC(EE)302: Analog Electronic circuit

EC(EE)302.1: Able to design different filters, regulator circuit and SMPS
EC(EE)302.2: Understand biasing technique, h model, high frequency model of transistor, RC coupled amplifier and power amplifier using transistor
EC(EE)302.3: Analyze feedback amplifier and different oscillator circuit like colpitts, hartley's, phase shift, wein bridge and crystal oscillators
EC(EE)302.4: Able to understand op-Amp parameter and application of op-Amp inadder, integrator &differentiator, comparator, Schmitt trigger, instrumentation amplifier, log & anti-log amplifiers, trans-conductance multiplier, precision rectifier, voltage to current and current to voltage converter, free running oscillator.
EC(EE)302.5: Develop the knowledge of monostable, bistable, astable multivibrators, operation of monostable and astable

multivibrator
using 555 timer, VCO and PLL circuit design.

ME(EE)301: Thermal Power Engineering

On completion of the course students will be able to

ME(EE)301.1: Discuss the energy resources and energy conversion methods available for the production of electric power in India.

ME(EE)301.2: Determine the efficiency and output of a modern Rankine cycle steam power plant from given data, including superheat, reheat, regeneration, and irreversibility's and combustion air requirements of conventional steam generators (boilers).

ME(EE)301.3: Select the heat transfer tubes needed for condensers and feed water heaters.

ME(EE)301.4: Explain the blade shapes, and calculate work output of typical turbine stages.

ME(EE)301.5: Calculate the performance of gas turbines with reheat and regeneration, and discuss the performance of combined cycle power plants.

ME(EE)301.6: Calculate the performance of I.C Engine with different efficiency and discuss the all other performance parameters of I.C Engine.

EE391: Circuit Theory and Network Lab

EE391.1: Students will be able to identify the different circuit elements and draw the circuit diagrams with the help of modern software.

EE391.2: Students will be able to prepare the circuit diagrams and learn the different commands used for circuit simulation.

EE391.3: Students will be able to write reports on experiments related to Network theorem, Circuit Transients, Two Port Network Filter.
EE391.4: Students will be able to recall the knowledge on different methods of Circuit Analysis and verify the results by software simulation
EE391.5: Students will be able to solve complex problems in different electrical circuits.
EE391.6: Students will be able to maintain a good team work in regular basis.

EC(EE)391: Analog and Digital Electronics Lab

EC(EE)391.1: Able to construct half wave, full wave and bridge rectifier
circuits, regulator
EC(EE)391.2: Able to design Transistor based single stage R-C coupled voltage
amplifier and different classes of power amplifier circuit with given
specification.
EC(EE)391.3: Able to design voltage to current and current to voltage
converter using OP Amp
EC(EE)391.4: Able to construct astable and mono-stable mode timer circuit using IC 555.
EC(EE)391.5: Able to create DAC and ADC

ME(EE)391: Thermal Power Engineering Lab

At the end of the course students are able to
ME(EE)391.1: Evaluate the performance of IC engines.
ME(EE)391.2: Perform heat balance analysis of IC engines.
ME(EE)391.3: Evaluate the performance of a reciprocating air compressor.

ME(EE)391.4: Plot Valve and Port timing diagrams of 4-stroke and 2-stroke engines.
ME(EE)391.5: Compile and present specifications of two and four wheelers.
ME(EE)391.6: Get familiarize with the overall process flow in thermal power plant.

HU381: Technical Report Writing & Power Point Presentation Lab
HU381.1: Build confidence in speaking, reading and writing English professionally
HU381.2: Understanding communication techniques and learning the method of technical writing.
HU381.3: To be prompt in public speaking spontaneously on given subjects.
HU381.4: To preserve proper body language.
HU381.5: To have confidence to participate in any kind of given conversation and deliver presentations.

2nd Year 4th Semester

EE401: Electrical Machine I

EE401.1: Student will be able to understand the role and need of Singly Excited and Doubly Excited Magnetic System in operation of electrical machines.
EE401.2: Student will be able to explain different terms related to armature winding and its connections.
EE401.3: Student will be able to apply different terms related to armature winding and its connections
EE401.4: Student will be able to conceptualize the physical significance of equivalent circuit of different kind of DC Machines, Induction Motors and Transformer and the process of determining their values and finding out losses.

EE401.5: Student will be able to demonstrate the ability to select specific types of starter and speed control applicable to DC Motors and Induction Motors.
EE401.6: Student will be able to understand the purpose of different types of industrial testing DC Machines, Induction Motors and Transformers.

EE402: Electrical & Electronic Measurements

EE402.1: Student will be able to measure the resistance, inductances and capacitances using various bridges and can also explain static and dynamic characteristics.
EE402.2: Student will be able to understand the principle of operation and construction of PMMC, MI instruments, electrodynamometer and induction type instruments.
EE402.3 Student will be able to identify instrument transformers and also estimate their performance.
EE402.4: Student will be able to calibrate ammeter and voltmeter by potentiometer.
EE402.5: Student will be able to explain the principle of operation of the electronic voltmeter, digital voltmeter signal generator and function generator.
EE402.6: Student will be able to understand the function of cathode ray oscilloscope and application of the instrument in phase and frequency measurement.

PH 401: Physics-II

PH 401.1: Able to apply the knowledge of Operators in wave mechanics, Magnetism and semiconductor physics in data storage.
PH 401.2: Able to analyze type of magnetic materials to be used for data storage purpose
PH 401.3: Able to discriminate between different statistics.

PH 401.4: Able to conduct experiments using Band theory and electron transport in a semiconductor.

M(CS)401: Numerical Methods

M(CS)401.1: Able to numerically approximate functions with polynomials.
M(CS)401.2: Able to understand basics of finite precision arithmetic, conditioning of problems and stability of numerical algorithms.
M(CS)401.3: Able to solve numerically a scalar nonlinear equation.
M(CS)401.4: Able to solve dense systems of linear equations and have a working knowledge of LU factorizations for these problems.
M(CS)401.5: Able to use the method of lines to solve basic partial differential equations.

CS(EE)402: **Data Structures**

CS(EE)402.1: Understand the concept of abstract data types and algorithms.
CS(EE)402.2: Understand linear data structures such as arrays, linked lists, stacks and queues.
CS(EE)402.3: Understand non-linear data structures such as tree, graph.
CS(EE)402.4: Apply different data structures in building applications.

EE491: Machine I Lab

EE491.1: Students will be able to perform different hardware experiments.

EE491.2: Students will be able to take initiative to identify, formulate and analyse problems regarding Different electrical machine

EE491.3: Student will be able to write report on the performed experiment

EE491.4: Student will be able to perform the experiment effectively as an individual

EE491.5: Student will be able to provide meaningful solutions by applying knowledge acquired in machines.

EE491.6: Student will be able to function as a member or leader in team regularly.

EE492: Electrical & Electronic Measurement Lab

EE492.1: Students will be able to gain knowledge on the construction of the instruments and measurement of different electrical parameters.

EE492.2: Students will be able to calibrate instruments and analyse the errors in measurements

EE492.3: Student will be able to write report on the performed experiment

EE492.4: Student will be able to understand the connection diagram of hardware panels (Like poly Phase circuit, Instrument Transformer, Energy meter, and various A.C bridges)and perform the measurement procedure.

EE492.5: Student will be able to identify the different measurement techniques required for field work.

EE492.6: Student will be able to function as a member or leader in team regularly.

PH 491: Physics-II Lab

PH 491.1: Able to understand the spin resonance of atoms.

PH 491.2: Able to explain the behaviour of a magnet.

PH 491.3: Able to demonstrate the Hall Effect in conductors and semi-conductors.
PH 491.4: Able to measure the band gap for semi-conductors.

M(CS)491: Numerical Methods Lab

M(CS)491.1: Understand mathematical and statistical tools to solve problems
M(CS)491.2: Understand how to solve numerical problem using computer
M(CS)491.3: Implement several methods in terms of programming
M(CS)491.4: Apply the knowledge of algorithm in computer based system
M(CS)491.5: Find the numerical solution and compare with other existing methods

CS(EE)492: Data Structures Lab

CS(EE)492.1: Choose appropriate data structure as applied to specified problem definition.
CS(EE)492.2: Handle operations like searching, insertion, deletion, traversing mechanism on various data structures.
CS(EE)492.3: Have practical knowledge on the applications of data structures

3rd Year 5th Semester

EE501: Electrical Machine II

EE501.1: Student will be able to understand the role and need of Single phase induction motor and synchronous machine and different special type of machines.

EE501.2: Student will be able to explain different terms related to armature winding and its connections.

EE501.3:Student will be able to explain different types of operating principle of single phase induction motor and synchronous machine, brushless dc machine, permanent magnet motor, hysteresis motor, stepper motor, tacho generator, synchros and servomotor.

EE501.4: Student will be able to model equivalent circuit of different kind of single phase induction Motors and synchronous machine and the process of determining their values of circuit parameter and finding out losses

EE501.5: Student will be able to demonstrate the ability to select specific types of starter and speed control methods applicable to synchronous Motors and single phase Induction Motors

EE501.6: Student will be able to explain different types of industrial testing of synchronous Machines and single phase induction motors and , brushless dc machine, permanent magnet motor, hysteresis motor, stepper motor, tacho generator, synchros and servomotor.

EE 502: Power System I

EE502.1: Students will be able to estimate the different type of losses in transmission line and how to overcome those losses.
EE502.2: Students will be able to explain the electrical design of transmission line which includes choice of voltage, type of grounding, insulation design and transmission of EHV AC and HV DC.
EE502.3: Students will be able to calculate the different parameter of transmission line like (inductance, capacitance).
EE502.4: Students will be able to differentiate the different types of supply system.
EE502.5: Students will be able to understand basics of Corona, Sag and other problems arise in Transmission Lines.
EE502.6: Students will be able to analyse the Performance of Transmission Lines, Efficiency in Transmission Lines.

EE 503: Control System I

EE503.1: Student will be able to understand the use of feedback systems, open loop and closed loop systems
EE503.2: Student will be able to determine transfer function by block diagram reduction technique and signal flow graph .
EE503.3: Student will be able to analyse time response of linear control systems.

EE503.4: Student will be able to apply Routh stability criteria to estimate the stability of the system.
EE503.5: Student will be able to apply of Nyquist method and Bode plot for the determination of stability.
EE503.6: Student will be able to understand Compensation Technique and PID controller.

EE 504C: Microprocessor & Microcontroller

EE504C.1: Able to correlate the architecture, instructions, timing
diagrams, addressing modes, memory interfacing, interrupts, data communication of 8085.
EE 504C.2: Able to interpret the 8086 Microprocessor-Architecture, Pin details, memory segmentation, addressing modes, basic instructions, interrupts.
EE 504C.3: Able to recognize 8051 micro controller hardware, input/output pins, ports, external memory, counters and timers, instruction set, addressing modes, serial data i/o, interrupts
EE 504C.4: Able to apply instructions for assembly language programs of 8085, 8086 and 8051.
EE 504C.5: Able to design peripheral interfacing model using IC 8255, 8253, 8251 with IC 8085, 8086 and 8051.

HU501: Environmental Science

HU501.1: To understand the natural environment and its relationships with human activities.
HU501.2: To apply the fundamental knowledge of science and engineering to assess environmental and health risk.
HU501.3: To develop guidelines and procedures for health and safety issues obeying the environmental laws and regulations.
HU501.4: Acquire skills for scientific problem-solving related to air, water, noise & land pollution.

EE591: **Electrical Machine II lab**

EE591.1: Students will be able to perform different methods of starting of a 3 phase Cage Induction Motor Speed control of 3 phase squirrel cage induction and Speed control of 3 phase slip ring Induction motor by rotor resistance control.
EE591.2: Students will be able to take initiative to identify, formulate and analyse problems regarding Synchronous machine, single phase Induction motor
EE591.3: Student will be able to write report on the performed experiment
EE591.4: Student will be able to perform the experiment effectively as an individual
EE591.5: Student will be able to provide meaningful solutions in real life application by applying knowledge acquired in electrical machines
EE591.6: Student will be able to function as a member or leader in team regularly.

EE592: Power Systems I Lab

EE592.1: Student will be able to estimate the performance of transmission line.
EE592.3: Students will be able to identify different methods of distribution.
EE592.4: Students will be able to measure different parameters of insulating materials
EE592.5: Students will be able to understand active & reactive power control.
EE592.6: Students will demonstrate ability to work with modern power system software.

EE593: Control System I Lab

EE593.1: Student will be able to perform different experiments on LTI systems
EE593.2: Student will be able to take initiative to identify, formulate and analyze problems regarding stability analysis and frequency response
EE593.3: Student will be able to write report on the performed experiment.
EE593.4: Student will be able to perform the experiment effectively as an individual using MATLAB
EE593.5: Student will be able to provide meaningful solutions by applying knowledge acquired in control system.
EE593.6: Student will be able to function as a member or leader in team regularly.

EE 594C: **Microprocessor & Microcontroller lab**

EE 594C.1: Able to Understand and apply the fundamentals of assembly level programming of microprocessors and microcontroller.
EE 594C.2: Work with standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters
EE 594C.3: Analyze abstract problems and apply a combination of hardware and software to address the problem;
EE 594C.4: Use standard test and measurement equipment to evaluate digital interfaces.

EE581: Electrical System Design I
EE581.1: The students would individually design the equipment and systems as per specifications provided by the class teacher following established procedures for unspecified items of specification and or specifications of wires, cables etc., data should be taken by students from handbooks and Indian standard.
EE581.2: Students should be able to carry out design computations of electrical circuits.
EE581.3: Students should maintain a dedicated bound notebook for recording design activities like calculations, formulae used, sketches, flowcharts etc.
EE581.4: Student should be able to design a heating element with specified wattage, voltage and ambient temperature and Designing an aircore grounding reactor with specified operating voltage, nominal current and fault current.
EE581.5: To Design the power distribution system for a small township/ a 4-5storied building.

3rd Year 6th Semester

EE601: Control Systems II

Students will be able to

EE601.1: demonstrate an understanding of the fundamentals of (feedback) control system and determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.

EE601.2: express and solve system equations in state-variable form (state variable models).

EE601.3: determine the time and frequency-domain responses of first and second-order systems to step and sinusoidal (and to some extent, ramp) inputs and determine the (absolute) stability of a closed-loop control system.

EE601.4: apply root-locus technique to analyse and design control systems.

EE601.5: communicate design results in written reports

EE 602: Power System II

EE602.1: Students will be able to understand per unit system.

EE602.2: Students will be able to apply Positive Sequence, Negative & zero sequence system and fault analysis.

EE602.3: Students will be able to model a modern Power System.

EE602.4: Student will be able to explain the load flow technique.

EE602.5: Students will be able to examine protection of power system with various protection relays.

EE602.6: Students will be able to understand that in real world, how to control active and reactive power

EE 603: Power Electronics

EE603.1: Student will be able to understand the role and need of the Concept of power electronics, application of power electronics in electrical industry.
EE603.2: Student will be able to explain different characteristics like Switching characteristics, Gate characteristics of Power Semiconductor devices.
EE603.3: Student will be able to demonstrate the change in working principle of different type of AC-DC converters at different load condition.
EE603.4: Student will be able to select specific types of DC-DC converter circuits based on different applications.
EE603.5: Student will be able to design DC-AC converters (Inverter) with different switching topologies and control of output voltage and frequency.
EE603.6: Student will be able to understand various types of AC controllers and Cyclo converters with different loaded conditions.

EE605: Renewable and Non- Conventional Energy Sources

EE605.1: Student will be able to understand the importance of Renewable energy over the conventional process of power generation techniques in the present age.
EE605.2: Student will be able to learn different methods of Power generation from the Non- conventional sources like Solar, Wind Energy, Biomass, Geothermal energy

EE605.3: Recent trend of renewable power generation like OTEC, tidal Energy and MHD power generation schemes to be introduced among students.

EE605.4: Students will be introduced to learn the different techniques of grid integration of the power generated from renewable energy sources with the initiation of power electronic converters and drives

EE605.5: Student will be able to design innovative projects utilizing these renewable resources.

EE605.6: Student will be able to understand various types of energy storage systems using hydrogen energy and fuel cells.

CS(EE)606:Computer Architecture and operating systems

CS(EE)606.1: To learn the basic concepts of operating systems and computer architecture.

CS(EE)606.2: To understand the services provided by and the design of an operating system.

CS(EE)606.3: To understand processes synchronized and scheduled.

CS(EE)606.4: To focus on the architecture & operation of the CPU.

EC(EE)604:Digital Signal Processing

EC(EE)604.1: Able to find DFT of a given signal through Fast Fourier Transform
Techniques.

EC(EE)604.2 : Able to design FIR and IIR type digital filters.

EC(EE)604.3: Able to identify filter structures and evaluate the coefficient
quantization effects.

EC(EE)604.4: Able to understand sample rate conversion techniques
EC(EE)604.5: able to design sequential and combinational circuit using logic gates
EC(EE)604.6: Able to compare the architectures of DSP and General Purpose Processors.

EE691: Control System II lab

EE691.1: Student will be able to perform different experiments on non linearity.
EE691.1: Student will be able to take initiative to identify, formulate and analyse problems regarding lead-lag compensation, state variable analysis using simulation tools.
EE691.1: 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.

EE692: Power System II Lab

EE692.1: Students will demonstrate ability to identify modern power system switchgear.
EE692.2: Students will be able to develop load flow programs for a given power system network.

EE692.3: Students will be able to estimate the contributions of different generators in economic load dispatch.
EE692.4: Students will be able to classify different methods of protection of electrical machines.

EE693: Power Electronics Lab

EE693.1: Students will be able to gain knowledge on Power Electronics field based on hardware setup as well different simulation studies, application of Power Electronics in electrical industries
EE693.2: Students will be able to understand different characteristics like SCR characteristics, Traiac characteristics through hardware set up
EE693.3: Student will be able to perform different simulations like AC controller performance with R,R-L load, performance of step up and set down Chopper with different power electronics switches like MOSFET,IGBT,GTO.
EE693.4: Student will be able to perform different experiments like AC controller performance with R,R-L load, performance of step up and set down Chopper using simulation software.
EE693.5: Student will be able to simulate PWM bridge Inverter with different loads, AC converter with R, R-L Load.
EE693.6: Student will be able to perform experiment in a group and work as a member or leader in team regularly.

EE681: Electrical System Design II

EE681.1: student should be design able to a heating element with specified wattage, voltage and ambient temperature.

EE681.1: student should be able to construct an air core grounding reactor with specified operating voltage, nominal current and fault current.

EE681.1: student should be able to model power distribution system for a small township.

EE681.1: student should be able to design a double circuit transmission line for a given voltage level and power (MVA) transfer.

EE681.1: student should be able to estimate the BOM (Bill Of Materials) for Wiring and installation design of a multistoried residential building (G+4,not less than 16 dwelling flats with a lift and common pump)

EE681.1: student should be able design a substation model.

CS(EE)696: Computer Architecture and Operating Systems Lab

CS(EE)696.1: Able to review of digital logic components.

CS(EE)696.2: Able to review of digital logic circuit analysis, design, and optimization.

CS(EE)696.3: Able to review of digital logic circuit design and simulation tools.

CS(EE)696.4: To make students able to implement CPU scheduling algorithms and Bankers algorithm used for deadlock avoidance and prevention.

CS(EE)696.5: Students will also be able to implement page replacement and memory management algorithms.

4th Year 7th Semester
EE 701: Electric Drives

EE701.1: Student will be able to understand the basic requirements of Electric Drives such as quadrant operation, energy consumption during starting, equivalent moment of inertia and torque etc. along with their dynamic equations
EE701.2: Student will be able to correlate Power Electronics Circuits and Electrical Machines
EE701.3: Student will be able to explain different types of rectifier systems used for DC drive systems and analysed their performances accordingly.
EE701.4: Student will be able to identify various types of inverter circuits suitable for AC drive system along with different types of speed control techniques
EE701.5: Student will be able to design inverters for harnessing solar power can be converted to AC power for domestic uses.
EE701.6: Students will be able to understand the ultimate uses of the different drives in the industries as per requirements.

HU701: Organizational behaviour Values and ethics

Upon completion of this course, students should have
HU701.1: Understood the core values that shape the ethical behaviour of an engineer
HU701.2: Exposed awareness on professional ethics and human values.
HU701.3: Known their role in technological development

EE702: Utilization of Electric Power

EE702.1: Students will be able to understand why electric traction is called ideal traction, how train moves from one to another place, it's different supply system, how different motors are used for this electric traction & their nature, different factors needed for the train movement.
EE702.2: Students will also be able to explain about the tractive effort needed for different times of traction, factors affecting specific energy consumption
EE702.3: Students will be able to understand how the braking & electrolysis occur in electric traction. Also they will understand why & how different power electronic controllers are needed in electric traction.
EE702.3: Students will be able to explain the process of different types of Heating, about various types of furnaces, different welding process.
EE702.4: Students will be able to understand about basic principles of Electrolysis process, Electro deposition, extraction & refining of metals & power supply of Electrolytic process.

EE703: Advanced Power Systems
Students will be:

EE703.1: Able to understand restructuring and regulation of Power Sector and Environmental aspects of Electric Power Generation
.**EE703.2:** Able to apply modern optimization techniques for Economic Operation of power systems
EE703.3: Able to understand and apply the technologies for ALFC and AVR.
EE703.4: Able to understand the principle of compensation in power systems, reactive power sensitivity and voltage control, Exciter and VAR control, Load compensation,

Line compensation, Passive shunt and series compensation, introduction to FACTs
controller (SVC, STATCOM).
EE703.5: Able to understand the various types of power system transients e.g. traveling waves / surges, generation of over voltages on transmission lines due to lightning or switching and apply adequate measure for protection of power system apparatus against surges.

CS(EE)705: Computer Networking

CS(EE)705.1: Demonstrate the networking strategies.
CS(EE)705.2: Examine the protocols operation of various layers of Data networks.
CS(EE)705.3: Identify the technical issues related to networking technologies.
CS(EE)705.4: Design and build a network using routers.

EE791: Electrical Drives Lab

EE791.1: Students will be able to perform different types of DC Drives
EE 791.2: Students will be able to simulate different types of switching topologies required for three-phase inverter fed AC Drives through MATLAB Simulink
EE 791.3: Student will be able to simulate different types brakings applied to DC Motors through MATLAB Simulink.
EE 791.4: Student will be able to simulate different types brakings applied to DC Motors through MATLAB Simulink
EE 791.5: Student will be able to perform Programmable Logic Control (PLC) based AC and DC Motor Drives.

CS(EE)795: Computer Networking Lab

CS(EE)795.1: To design and implement small size network and to understand various networking commands.
CS(EE)795: To provide the knowledge of various networking tools and their related concepts
CS(EE)795: To understand various application layer protocols for its implementation in client/server environment

4th Year 8th Semester
HU801:Industrial and financial Management
HU801.1: Paves the way to get the knowledge over the proper utilization of limited resource and its utilizations.
HU801.2: Economically choosing of best alternatives.
HU801.3: How to lead one's personal life without putting debt trap.
HU801.4: Accounting process prevailing in India.
HU801.5: Ascertaining the strength of any organisation available in the country.

EE801: Energy Management and Audit

EE801.1: able to define different approaches of energy management.
EE801.2: able to determine the need and types of energy audit
EE801.3: able to determine various methods of energy saving by cost prediction.
EE801.4: Able to diagnose energy performance and analyse.
EE801.5: able to make an audit report.

EE802: Sensors and Transducers

EE802.1: To get the basic idea of measurements and the errors associated with measurement. **EE802.2:** To differentiate between the types of transducers available
EE802.3: To gain information about the function of various measuring instruments and using them

JIS GROUP

Educational Initiatives

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