

G.NARAYANAMMA INSTITUTE OF TECHNOLOGY AND SCIENCE (FOR WOMEN)

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE OUTCOMES - BLOOMS TAXONOMY LEVELS MAPPING (B.TECH - GNR-18)

Subject Name	CO No	Course outcome	Bloom's taxonomy
I B.Tech I sem			
Physics (BS111AC)	C101.1	Realize the importance of light interaction with matter and its effects of superposition.	L4
	C101.2	Understand the quantum mechanical behavior of particles in different field environments	L5
	C101.3	Distinguish materials on the basis of their electric and magnetic behavior and their applications	L2
	C101.4	Estimate the carrier concentration of different types of semiconductors and be able to understand the working of optoelectronic devices.	L3
	C101.5	Realize the importance of Lasers in engineering fields.	L4
	C101.6	Understand the underlying principles of optical fibers and fiber optics.	L1
Linear Algebra and Multivariable Calculus (BS111AB)	C102.1	Solve and analyze the solution for the system of equations.	L4
	C102.2	Compute the Eigen values and Eigen vectors which come across under linear transformations.	L4
	C102.3	Determine the extreme values of functions of two variables with/ without constraints.	L4
	C102.4	Find the solutions of ordinary differential equations.	L3
	C102.5	Evaluate double and triple integrals.	L4
	C102.6	Apply the knowledge of mathematics for real situations	L3

PROGRAMMING FOR PROBLEM SOLVING (ES111AF)	C103.1	Formulate and translate algorithms for arithmetic and logical problems to programs (in C language).	L6
	C103.2	Test and execute the programs and correct syntax and logical errors.	L3
	C103.3	Implement conditional branching, iteration and recursion	L3
	C103.4	Decompose a problem into functions and synthesize a complete program.	L4
	C103.5	Use arrays, pointers and structures to formulate programs.	L3
	C103.6	Understand the concepts of files and perform operations on them	L2
ENGINEERING GRAPHICS (ES111AE)	C104.1	Know and understand the conventions and methods of Engineering Graphics	L2
	C104.2	Construct the conics using different methods and cycloidal curves	L6
	C104.3	Draw and understand about orthographic projections of points , straight lines and planes	L2
	C104.4	Improve visualisation skills in different types of solid	L2
	C104.5	Draw and understand about the development of surfaces of various solids	L2
	C104.6	Ability to read, understand and interpret engineering drawing	L2
ENGINEERING WORKSHOP (ES11104)	C105.1	Demonstrate and understand the Engineering workshop safety regulations.	L2
	C105.2	Identify and use marking tools, measuring equipment and to work to prescribed accuracies.	L1
	C105.3	Know various operations in basic engineering workshops	L2
	C105.4	Understand the practical difficulties encountered in industries during any assembly work.	L2
	C105.5	Do simple electrical work through their carrier.	L3
	C105.6	Design different prototype in the fittings, carpentry, foundry, black smithy and sheet metal work.	L6

PHYSICS LAB (BS11102)	C106.1	Handle different measuring instruments and asses their accuracy of measurement	L1
	C106.2	Experiment and analyze the results to derive valid conclusions	L4
	C106.3	Compare the experimental results with those introduced in lecture, draw relevant conclusions and substantiate	L5
	C106.4	Develop the experimental skills to design new experiments in engineering.	L3
	C106.5	Understand the ethics of working environment and deliver the results in time.	L2
	C106.6	Engage themselves in team work and understand each other's strengths.	L2
PROGRAMMING LAB (ES1110)	C107.1	Compile, debug and test the program.	L3
	C107.2	Apply the knowledge in C to write modular, structured programs in solving real world problems.	L3
	C107.3	Design programs to solve mathematical and scientific problems.	L6
	C107.4	Write structured programs using control structures and functions.	L3
	C107.5	Demonstrate usage of pointers and structures.	L2
	C107.6	Solve problems using file concepts.	L3

I B.Tech II Sem

CHEMISTRY (BS112AA)	C108.1	Analyze microscopic chemistry in terms of atomic and molecular orbitals.	L5
	C108.2	Students will gain the basic knowledge of electrochemical procedures related to corrosion and its control	L3
	C108.3	Rationalize periodic properties such as ionization potential, electronegativity and oxidation states.	L2
	C108.4	Students can develop and apply the concepts to identify the hardness and boiler troubles of water.	L2

	C108.5	List major chemical reactions that are used in the synthesis of drugs.	L1
	C108.6	Students can develop and apply the concepts for the solutions of complex engineering problems.	L3
NUMERICAL TECHNIQUES AND TRANSFORM CALCULUS (BS112AG)	C109.1	Find the root of the equation and solution of a system of equations	L1
	C109.2	Fit a curve for the given data.	L2
	C109.3	Find the Numerical solutions for a given first order initial value problem.	L3
	C109.4	Use Laplace Transform techniques for solving ODE's.	L3
	C109.5	Verify the irrotational and solenoidal fields and find the potential function.	L4
	C109.6	Evaluate the line, surface and volume integrals and converting them from one to another.	L5
ENGLISH (HS112AJ)	C1010.1	Read complex texts actively comprehending the literal and figurative use of language and be able to read in-between the lines.	
	C1010.2	Write grammatically correct sentences and coherently well-developed paragraphs.	L2
	C1010.3	Apply the reading techniques and comprehend the passages critically.	L3
	C1010.4	Use appropriate vocabulary in the given context.	L3
	C1010.5	Appreciate how different genres use language and shape meanings.	L3
	C1010.6	Articulate clear questions, to provoke critical thinking, and ideas in class discussion to speak confidently in public.	L5
BASIC ELECTRICAL ENGINEERING (ES112AD)	C1011.1	Analyze the basic circuits with application of Network Reduction Techniques and Network Theorems.	L3
	C1011.2	Understand and analyze magnetic circuits.	L2
	C1011.3	Analyze the working principles of electrical machines and power converters	L3
	C1011.4	Understand the components of low voltage electrical installations	L3

	C1011.5	Apply the above conceptual theories to real world Electrical & Electronic problems and applications	L4
	C1011.6	Understand and apply the Knowledge of various types of protective systems in real time.	L3
CHEMISTRY LAB (BS11207)	C1012.1	Expected to learn from this laboratory course the concept of error and its analysis.	L2
	C1012.2	Demonstrate writing skills and can derive valid conclusions.	L5
	C1012.3	Compare the experimental results with those introduced in lecture, draw relevant conclusions and substantiate.	L3
	C1012.4	Learn the ability to prepare advanced drug materials	L4
	C1012.5	Work on time reactions, thereby can get in depth knowledge on chemical kinetics.	L2
	C1012.6	The course allows the students to develop and design new experimental skills relevant to the course	L6
	ENGLISH PROFESSIONAL AND COMMUNICATION SKILLS LAB (HS11212)	C1013.1	Differentiate between the letters of alphabet and the phonetic symbols
C1013.2		Demonstrate the right pronunciation of the words in English using phonetic transcription and word stress.	L2
C1013.3		Speak with the proper intonation, voice modulation and tonal groups	L6
C1013.4		Demonstrate the listening skills through language modules.	L2
C1013.5		Speak with clarity and confidence individually and in groups to discuss and present the topics chosen and understand the nuances of team dynamics	L6
C1013.6		Work individually and in teams present the topics and demonstrate their public speaking skills and presentation skills through various aids like posters, PPTs etc.,	L2
BASIC ELECTRICAL ENGINEERING LAB(ES11209)		C1014.1	Identify & use basic measuring instruments and their usage.
	C1014.2	Verify different network theorems with dc excitation.	L3
	C1014.3	Carry out analysis of simple circuits with dc excitation.	L5
	C1014.4	Analyze bridge rectifiers.	L1

	C1014.5	Identify power converters.	L3
	C1014.6	Identify different electrical machines & their characteristics	L3
COMPUTATIONAL MATHEMATICS LAB (ES11210)	C1015.1	Write Flow chart and algorithm for the given program.	L6
	C1015.2	Have the ability to write C programs to solve specified problems.	L2
	C1015.3	Find the root of a given equation using C program.	L3
	C1015.4	Use arrays as part of the software solution.	L3
	C1015.5	Utilize pointers to efficiently solve problems.	L3
	C1015.6	Utilize pointers to efficiently solve problems.	L1

II B.Tech I sem

MATHEMATICAL ANALYSIS (BS113AK)	C201.1	Express an infinite series representation of periodic function in terms of the trigonometric sine and cosine functions.	L4
	C201.2	Solve first order partial differential equations.	L3
	C201.3	Understand about analyticity of complex functions and its properties.	L2
	C201.4	Integrate a complex valued function in a given region.	L3
	C201.5	Expand a complex function in a given region of convergence using Taylor's and Laurent's series	L4
	C201.6	Applying knowledge of complex integrals for evaluation of real integrals	L3
	C202.1	Analyze magnetic circuits.	L3

CIRCUIT THEORY(ES113AM)	C202.2	Apply network theorems for the analysis of electrical circuits.	L4
	C202.3	Obtain the transient and steady-state response of electrical circuits.	L4
	C202.4	Analyze two-port circuit behavior.	L3
	C202.5	Construct and analyze locus diagrams for RL, RC and RLC networks.	L4
	C202.6	Apply the concept of different types of basic filters to construct composite filters.	L4
	ANALOG ELECTRONICS(PC113AR)	C203.1	Understand the fundamental behaviour of various diodes, transistors and OP-AMP
C203.2		Illustrate the construction, operation and characteristics of BJT and MOSFET	L2
C203.3		Analyze the various amplifier circuits using small signal hybrid model.	L3
C203.4		Classify various MOSFET configurations.	L4
C203.5		Distinguish between various power amplifiers.	L4
C203.6		Apply the knowledge of Diodes, OP-AMPs in designing circuits	L3
ELECTRICAL MACHINES - I (PC113AU)	C204.1	Understand the concepts of magnetic circuits.	L2
	C204.2	Understand the operation and control of dc machines.	L3
	C204.3	Analyze the differences in operation of different dc machine configurations.	L2
	C204.4	Analyze single phase and three phase transformers circuits	L4
	C204.5	Identify proper type of motors suitable for a given application.	L5
	C204.6	Extend the concepts of single phase transformer in fabricating and analyzing various configurations of three phase transformer.	L5
	C205.1	Apply the principles of Vector Algebra to understand the basic laws of electric and magnetic fields.	L2

ELECTROMAGNETIC FIELDS(PC113AV)	C205.2	Distinguish between the properties of conductors & Dielectrics under the influence of both electric and magnetic fields	L2
	C205.3	Formulate and Solve typical problems w.r.t. electrostatics and magneto statics in different media	L4
	C205.4	Analyze/interpret various field equations in both point form and integral form	L5
	C205.5	Analyze the problems related to both static and time varying fields by using Maxwell's Equations.	L3
	C205.6	Extend the concepts of field theory to realize plane wave motion and also acquire the concepts of Electromagnetic Interference	L3
	CIRCUITS LAB(ES11315)	C206.1	Analyze various theorems for linear AC circuits.
C206.2		Evaluate two port network parameters for various electrical circuits.	L3
C206.3		Analyze the transient and steady state behavior of AC circuits.	L4
C203.4		Understand the concept of three phase balanced and magnetic circuits.	L3
C203.5		Design passive filters and analyze different network topologies.	L4
C203.6		Determine self and mutual inductances and coefficient of coupling through the knowledge of "Magnetic Circuits"	L2
ANALOG ELECTRONICS LAB(PC11318)	C207.1	Illustrate the utility of various semiconductor devices, passive elements, circuit behavior and parameters to be estimated.	L1
	C207.2	Identify specifications, choice of device and equipment required; develop of the circuit and measurement of various diodes and transistor circuit characteristics	L2
	C207.3	Set up different types of rectifiers, circuits to interpret the different applications of op-Amps	L3
	C207.4	Design, develop and test BJT and FET amplifier circuits and estimate the relevant parameters.	L4
	C207.5	Compare the experimental results with theoretical results, explain the parameters involved and justify the results obtained.	L4
	C207.6	Interpret the results for further development of circuit features and subsequent applications	L3
	C208.1	Analyze the characteristics of DC machines.	L3

ELECTRICAL MACHINES - I LAB (PC11321)	C208.2	Carry out various tests to assess the performance of DC Machines	L3
	C208.3	Understand different starting methods of DC Machines.	L2
	C208.4	Know conceptual things to implement in real time applications.	L1
	C208.5	Choose suitable DC motor for a specific application.	L4
	C208.6	Identify the relevant speed control technique based on the application.	L5
	GENDER SENSITIZATION(MC1131 7)	C209.1	Students will be sensitized to basic dimensions of the biological,sociological,psychological and legal aspects of gender. this will be achieved through discussion of materials derived
C209.2		Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.	L2
C209.3		Students will acquire insight into the gendered division of labour and its relation to politics and economics.	L2
C209.4		Men and women students and professionals will be better equipped to work and live together as equals	L3
C209.5		Students will develop a sense of appreciation of women in all walks of life	L6
C209.6		Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand	L5

II B.Tech II sem

TRANSFORM TECHNIQUES AND APPLICATIONS (TTA)(BC114BB)	C2010.1	Understand the theory of probability distributions.	L2
	C2010.2	Determine the Fourier Transform of a given function.	L3
	C2010.3	Evaluate the Z transform of the given function.	L5
	C2010.4	Identify Different Types of Elementary Signals.	L1

(IIA)(DS117DD)	C2010.5	Apply the concepts of Fourier transforms to Signals and Systems.	L3
	C2010.6	Use the concepts of Z transforms to Signals and Systems.	L3
MATERIAL SCIENCE(ES114BC)	C2011.1	Identify crystal structure for various materials	L1
	C2011.2	Understand the mechanical properties of metals	L2
	C2011.3	Classify the metals and their applications	L4
	C2011.4	Assess the thermal and electrical properties of metals	L5
	C2011.5	Classify the Nonmaterial and properties	L4
	C2011.6	Analyse the economic, environmental and social issues in material science	L4
DIGITAL ELECTRONICS(PC114BK)	C2012.1	Recall fundamental concepts and techniques involved in the design of digital circuits	L1
	C2012.2	Comprehend the concepts to design basic combinational and sequential circuits	L2
	C2012.3	Demonstrate building of various designs using basic digital blocks.	L3
	C2012.4	Verify the digital designs for required functionality.	L4
	C2012.5	Interface ICs from different logic families.	L3
	C2012.6	Analyse the design and performance of different Data Converters.	L4
ELECTRICAL MACHINES-II(PC114BL)	C2013.1	Analyze the construction and operating characteristics of Induction motor, synchronous machines and fractional KW machines	L4
	C2013.2	Analyze the Induction motor and Synchronous machine performance for different loading conditions, as well operating in parallel.	L4
	C2013.3	Carry out different speed control methods and various tests to assess the performance of AC Machines.	L3
	C2013.4	Identify and design the suitable AC machine for the desired application based on their characteristics.	L6

	C2013.5	Understand Different starting methods of AC Machines.	L2
	C2013.6	Apply conceptual things to implement real time electrical problems in commercial and domestic application.	L3
POWER SYSTEMS-I(PC114BP)	C2014.1	Understand the operation of conventional generating stations like Thermal, Hydro, Nuclear and renewable energy sources.	L1
	C2014.2	Understand the economic aspects and tariff methods of power.	L2
	C2014.3	Understand design of Insulators, sag and tension.	L3
	C2014.4	Understand structure of different underground cables and design.	L2
	C2014.5	Understand transmission line parameters.	L3
	C2014.6	Calculate transmission line parameters.	L5
ELECTRICAL MACHINES - II LAB(PC11430)	C2015.1	Analyze the characteristics of AC machines.	L4
	C2015.2	Carry out various tests to assess the performance of AC Machines	L3
	C2015.3	Understand different starting methods of AC Machines.	L2
	C2015.4	Know conceptual things to implement in real time applications.	L1
	C2015.5	Identify and analyze the methods for determination of regulation of a synchronous generator based on the merits.	L4
	C2015.6	Draw the equivalent circuits of different AC machines by conducting suitable experiments.	L5
ELECTRICAL SIMULATION LAB(PC11431)	C2016.1	Apply different signals to different systems and observe the responses.	L3
	C2016.2	Analyze networks by various techniques or theorems.	L4
	C2016.3	Synthesize a given wave form using Laplace Transform.	L2
	C2016.4	Analyze bridge rectifiers.	L3

	C2016.5	Measure three phase power in a balanced or unbalanced three phase load	L5
	C2016.6	Construct and analyze a solar PV system.Using appropriate SIMULATION packages	L3
DIGITAL ELECTRONICS LAB(PC11429)	C2017.1	Identify Digital ICs.	L3
	C2017.2	Identify function of Digital ICs. Test and Verify the Digital ICs.	L4
	C2017.3	Design combinational logic circuits.	L6
	C2017.4	Design sequential logic circuits	L6
	C2017.5	Calculate resolutions of ADC's and DAC's	L5
	ENVIRONMENTAL SCIENCES(MC114BE)	C2010.1	Benefited by various ecological principles and environmental regulations for sustainable development.
C2010.2		Able to identify/analyze/evaluate/demonstrate the consequences of developmental activities and mitigation measures.	L5
C2010.3		Develop the advanced technologies in protection/conservation of resources in sustainable approach.	L6
C2010.4		Improved in attitude & thinking of the students will be positively towards earth & environment.	L2
C2010.5		Benefited by knowing the concepts like Green Buildings, Low Carbon Lifestyle, International conventions etc.	L2
C2010.6		It helps the students to improve the quality of life.	L1

III B.Tech I sem

MANAGERIAL ECONOMICS AND	C301.1	Cognize the Basic Concepts of Economics.	L2
	C301.2	Analyze the economic concepts for using discretion in business problem solving	L4
	C301.3	Comprehend the concepts of Accounting for business decision making	L3

FINANCIAL ANALYSIS(HS115CH)	C301.4	Assimilate the basic Accounting Procedure and interpret the statements	L5
	C301.5	Analogize the external business environment for attainment of business goals	L4
	C301.6	Enable forecasting and analyzing the external business environment	L6
POWER SYSTEMS - II(PC115CJ)	C302.1	Analyze the performance of small, medium and Long Transmission lines	L4
	C302.2	Understand various factors governing the performance of transmission lines and power transients	L2
	C302.3	Understand Air insulated and Gas Insulated Substations	L2
	C302.4	Understand Voltage control in power systems.	L3
	C302.5	Understand per unit representation.	L2
	C302.6	Analyze and Understand D.C and A.C distribution systems	L4
CONTROL SYSTEMS (PC115BV)	C303.1	Obtain the mathematical model of Translational and rotational mechanical systems	L1
	C303.2	Obtain the mathematical models of DC Servo motor - AC Servo motor Synchro transmitter and Receiver	L2
	C303.3	Improve the system performance by selecting a suitable controller and/ or compensator for a specific application	L3
	C303.4	Apply various time domain and frequency domain techniques to assess the system performance.	L4
	C303.5	Able to design Lag, Lead and Lag-Lead compensators	L4
	C303.6	Test system Controllability and Observability using state space representation.	L5
ELECTRICAL MEASUREMENTS &	C304.1	Acquire the knowledge about the measuring instruments for measurement of voltage, current, power, energy, CRO	L2
	C304.2	Analyze the extension of range of measuring instruments and Different types of errors and their reduction techniques, CT and PT, Potentiometers.	L3
	C304.3	Evaluate power factor and frequency, phase sequence using power factor meter, frequency meter and synchroscope.	L3

INTSTRUMENTATION (PE115XX)	C304.4	Measure the resistance, inductance and capacitance by using various bridges and phase and frequency using CRO.	L5
	C304.5	Acquire the knowledge about Transducers and measurement of displacement ,velocity, angular velocity using strain gauge	L2
	C304.6	Apply the conceptual thing to real world electrical and electronics problems and applications	L6
COMPUTER ORGANISATION(PE115X X)	C305.1	Recognize the basic building blocks and functional details of a CPU.	L2
	C305.2	Discuss the features of a general purpose computer.	L2
	C305.3	Demonstrate the construction and operation of individual building blocks of a CPU.	L2
	C305.4	Illustrate the generation of control and timing signals for the CPU design.	L2
	C305.5	Employ advanced architectural features for performance improvement of the CPU	L3
	C305.6	Understand the parallelism both in terms of single and multiple processors.	L2
Special Machines(PE115XX)	C306.1	Learn about construction features and method of operation of various types of special machines	L2
	C306.2	Know the Characteristics of different types of special machines	L1
	C306.3	Understand various speed control methods of special machines	L2
	C306.4	Analyze the performance of Special Machines	L4
	C306.5	Analyze the performance characteristics of various special machines	L4
	C306.6	Know the real time applications of different types of special machines.	L2
FUNDAMENTALS OF DATA	C307.1	Analyse the time and space complexities of algorithm	L4
	C307.2	Differentiate between linear and non-linear data structure	L2
	C307.3	Use basic data structures such as linked list, stack and queue for data representation	L3

DATA STRUCTURES(OE115KA)	C307.4	Understand advanced data structures like binary trees, search trees and graphs	L2
	C307.5	Choose appropriate data structures to represent data items in real world problems.	L4
	C307.6	Analyse various kinds of searching and sorting techniques.	L4
JAVA PROGRAMMING(OE115KB)	C308.1	Understand the object oriented programming concepts and solve real world problems.	L2
	C308.2	Demonstrate the use of inheritance and packages.	L2
	C308.3	Understand and implement the concepts of exception handling	L2
	C308.4	Develop multithreaded applications with synchronization	L6
	C308.5	Solve problems using java collection framework and I/O classes	L3
	C308.6	Design Graphical User Interface using applets and swing controls.	L6
BASIC ELECTRONICS(OE115KC)	C309.1	Illustrate the fundamental behaviour of various diodes, transistors.	L1
	C309.2	Explain the construction, operation and characteristics of BJT, JFET and MOSFET	L1
	C309.3	Analyse the various amplifier circuits using small signal hybrid model	L3
	C309.4	Identify the necessity for biasing.	L1
	C309.5	To know the operation of various special purpose devices like LED, Photo diode and SCR.	L1
	C309.6	Apply the knowledge of Diodes in designing circuits like rectifiers.	L3
Electrical Materials	C3010.1	Distinguish between magnetic and non-magnetic materials by acquiring the knowledge of their atomic structures	L2
	C3010.2	Analyse Dielectric and semiconductor materials	L3
	C3010.3	Analyse the magnetic materials using their properties	L3

(OE115KD)	C3010.4	Identify special purpose materials for different applications	L2
	C3010.5	Analyse the working of different materials from the point of view of their applications in electrical industry.	L4
	C3010.6	Analyse the working of special purpose materials from the point of view of their possible applications electrical & other fields	L3
Operations Research(OE115KE)	C3011.1	Apply linear programming models to several Engineering Applications.	L3
	C3011.2	Use several other techniques like Transportation, Assignment and Sequencing Models in the real world applications.	L3
	C3011.3	Study selected Dynamic Programming models for real world situations.	L4
	C3011.4	Apply simple mathematical models in Inventory into the real Engineering Applications.	L3
	C3011.5	Solve Game theory problems related to business applications.	L3
	C3011.6	Develop optimum replacement policy.	L6
Introduction to Data Analytics(OE115KF)	C3012.1	Understand the definitions and concepts associated with central tendency and measures of dispersion	L2
	C3012.2	Find the probability of an event and know the properties of distribution	L1
	C3012.3	Determine the regression coefficient and test the accuracy of coefficient	L3
	C3012.4	Learn basic concepts in supervised learning	L1
	C3012.5	Attain basic knowledge in unsupervised learning	L2
	C3012.6	Understand past behavior of data and forecast the future behavior using time series analysis.	L5
Intellectual Property	C3013.1	Understand the dynamics and legalistic framework of IPR's	L2
	C3013.2	Acquaint with securing patents and its protection.	L5
	C3013.3	Seize the dimensions of Copy right protection.	L2

Rights(OE115KG)	C3013.4	Realize the eminence of Trade Marks in growth of business.	L3
	C3013.5	Essentials of safeguarding Industrial designs.	L1
	C3013.6	Sustentation of Trade Secrets and aspects of IP audit.	L4
Disaster Management(OE115KH)	C3014.1	Understand different kinds of disasters and their vulnerabilities.	L2
	C3014.2	Identify the causes, effects and mitigation measures of different disasters.	L1
	C3014.3	Apply the disaster management mechanism in natural and man induced calamities	L3
	C3014.4	Analyse and solve the unforeseen situations with advanced technologies like Remote Sensing and Geological Information Systems.	L5
ELECTRICAL MEASUREMENTS & INTSTRUMENTATION LAB(PC11540)	C3015.1	Calibrate the PMMC type Voltmeters, Ammeters, LPF wattmeter, energy meter and dynamometer type power factor meter	L3
	C3015.2	Determine the Low Resistance, Inductance, Capacitance	L3
	C3015.3	Test the Instrument transformers and methods of indicating dielectric strength and turns ratio of a transformer.	L5
	C3015.4	Measure the three phase active and reactive power using watt meters.	L5
	C3015.5	Identifying the use of transducers and measurement of Non-Electrical Quantities.	L4
	C3015.6	Apply the conceptual thing to real world electrical and electronics problems and applications	L6
CONTROL SYSTEMS LAB(PC11535)	C3016.1	Obtain the transfer function of DC Motor and DC Generators	L4
	C3016.2	Develop the logic to realize the Boolean expressions and able to control the speed and directions of stepper motor by Programmable logic controller.	L3
	C3016.3	Analyze the time response of second order RLC system.	L4
	C3016.4	Analyze the P, PI and PID controllers on the second order systems.	L4
	C3016.5	Design Lag, Lead and Lag- Lead compensators.	L6

	C3016.6	Analyze by simulation State space models, stability by root locus and bode plots for classical transfer function using MATLAB software	L3
EMPLOYABILITY AND SOFT SKILLS(HS11542)	C3017.1	Apply basic communication skills (LSRW) in work-related situations.	L3
	C3017.2	Acquire, organize, interpret and evaluate information for effective communications within a group. Demonstrate the ability to combine ideas or information in new ways and present information on	L5
	C3017.3	guided and structured format.	L2
	C3017.4	Make decisions and solve problems by specifying goals, identifying resources and constraints and evaluating results.	L5
	C3017.5	Display personal qualities such as responsibility, self-management, self-confidence, ethical behaviour and respect for self and others.	L2
	C3017.6	Learn to work cooperatively with people of diverse backgrounds and abilities, identify group's goals and values and contribute to a group process with ideas, suggestions and efforts.	L1

III B.Tech II sem

FUNDAMENTALS OF MANAGEMENT(HS116CY)	C3018.1	Associate the concept of Management in practical scenario for effective decision making.	L3
	C3018.2	Synthesize the preparation of effective plans in strategizing the decision making process	L5
	C3018.3	Circumscribe the authority responsibility conduct in an organization.	L2
	C3018.4	Intuit the human resource management in an organization towards achievement of effectiveness.	L4
	C3018.5	Cognize the role of leader and motivation in the attainment of objectives of an organization.	L2
	C3018.6	Understand articulating techniques of controlling in the process of an organization.	L6
	MICROPROCESSORS AND	C3019.1	Familiarize with the internal architecture and organization of 8086 and 8051
C3019.2		Write assembly language programs using 8086 and 8051.	L3
C3019.3		Design and develop micro controller based systems using 8051 interfacing	L4

MICROCONTROLLERS(PC116DF)	C3019.4	Apply the knowledge of 8051 micro controller in real time applications	L5
	C3019.5	Relate the memory organization and memory interface to 8086/8051.	L4
	C3019.6	Discuss various serial communication interface standards.	L2
POWER ELECTRONICS(PC116DH)	C3020.1	Understand the concepts of power semiconductor devices.	L2
	C3020.2	Analyze the performance single & three phase converters.	L4
	C3020.3	Design DC-DC converters	L6
	C3020.4	Understand the operation of Inverters.	L2
	C3020.5	Analyze single phase AC voltage & dual converters.	L4
	C3020.6	Design the commutation circuits and triggering circuits	L6
DIGITAL CONTROL SYSTEMS(PE116CU)	C3021.1	Distinguish between analog control systems and digital control systems by acquiring the knowledge on z-transforms and sampling for basic analysis of digital control system.	L4
	C3021.2	Develop and analyze pulse transfer function for discrete time system.	L2
	C3021.3	Analyze the performance of digital control systems using state space representation.	L3
	C3021.4	Analyze the performance and Stability of digital control systems through various classical and other methods.	L3
	C3021.5	Design Discrete-time control systems based on frequency response method i.e. lag, lead and lag-lead compensators etc.	L5
	C3021.6	Design State feedback controllers and observers using various techniques	L5
HIGH VOLTAGE	C3022.1	Understand the basic physics related to various breakdown processes in solid, liquid and gaseous insulating materials.	L2
	C3022.2	Acquire Knowledge of generation and measurement of different types of high voltages and currents.	L2
	C3022.3	Analyze the phenomenon of over voltages in a power system	L4

ENGINEERING(PE116CZ)	C3022.4	Analyze the methods of protection against over-voltages in a power system	L4
	C3022.5	Acquire Knowledge of tests on H. V equipment as per the standards.	L5
	C3022.6	Acquire Knowledge on layout of HV laboratories.	L5
ELECTRIC & HYBRID VEHICLES(PE116CW)	C3023.1	Identify the difference between conventional vehicles and Electric Vehicles.	L1
	C3023.2	Understand the models to describe hybrid vehicles and their performance, various battery sources and energy storage systems.	L2
	C3023.3	Apply the concepts of electrical machines, Power Electronics for the design of electric vehicles	L3
	C3023.4	Analyze the various vehicle technologies, Drive trains, Energy storage devices and energy management strategies.	L4
	C3023.5	Evaluate the suitable combination of electric motors, power electronic converters, and battery. Evaluate energy management strategies.	L5
	C3023.6	Develop the efficient and effective Hybrid Electric Vehicles.	L6
Operating systems(OE116KJ)	C3024.1	Acquire a High-level understanding of what is an operating system and the role it plays and the services it provides.	L2
	C3024.2	Understand process management concepts including scheduling, synchronization.	L2
	C3024.3	Describe System model for deadlock, Methods for handling deadlocks.	L1
	C3024.4	Understand of memory management including virtual memory.	L2
	C3024.5	Acquire Knowledge on issues related to file system interface and implementation.	L2
	C3024.6	Understand the issues related to disk management.	L2
DATABASE MANAGEMENT	C3025.1	Understand concepts and the applications of database systems and ability to implement in real time applications.	L2
	C3025.2	Construct an Entity-Relationship (E-R) model from specifications and transform to relational model.	L3
	C3025.3	Demonstrate the basic concepts of relational database management system and construct unary/binary/set/aggregate queries in Relational Algebra and in SQL.	L3

MANAGEMENT I SYSTEMS(OE116KK)	C3025.4	Apply normalization on database.	L3
	C3025.5	Understand principles of database transaction management.	L2
	C3025.6	Understand the storage and recovery of database	L2
PRINCIPLES OF ELECTRONIC COMMUNICATIONS(OE1 16KL)	C3026.1	Analyze the basic concepts of modulation and understand the different kinds of analog modulation techniques.	L4
	C3026.2	Understand and analyze the different types of pulse analog and digital modulation systems.	L1
	C3026.3	Describe the Telephone systems and network fundamentals.	L2
	C3026.4	State the operative physical principle of launching satellites and explain the concept & operation of GPS.	L1
	C3026.5	Comprehend about the principle of optical communication system, functioning of optical cables and wave division multiplexing.	L1
	C3026.6	Describe the cell phone operational concepts.	L2
RENEWABLE ENERGY SOURCES(OE116KM)	C3027.1	Estimate the solar energy, Utilization of solar energy, Principles involved in solar energy collection and conversion of it to electricity generation	L2
	C3027.2	Explore the concepts involved in wind energy conversion system by studying its components, types and performance	L4
	C3027.3	Understand the concept of Biomass energy resources and their classification, types of biogas Plants- applications	L2
	C3027.4	Acquire the knowledge on Geothermal energy and it's harnessing methods	L3
	C3027.5	Illustrate ocean energy and explain the operational methods of their utilization.	L4
	C3027.6	Describe the concept of direct energy conversion and their types and working principle	L2
OPERATIONS RESEARCH(OE115KE /	C3028.1	Apply linear programming models to several Engineering Applications.	L3
	C3028.2	Use several other techniques like Transportation, Assignment and Sequencing Models in the real world applications.	L3
	C3028.3	Study selected Dynamic Programming models for real world situations.	L4

RESEARCH(OE116KE / OE116KE)	C3028.4	Apply simple mathematical models in Inventory into the real Engineering Applications.	L3
	C3028.5	Solve Game theory problems related to business applications.	L3
	C3028.6	Develop optimum replacement policy.	L6
RESEARCH METHODOLOGY(OE116 KN)	C3029.1	Develop an understanding on various kinds of research and objectives of doing research.	L5
	C3029.2	Perform literature reviews using print and online databases.	L6
	C3029.3	Design good research.	L6
	C3029.4	Collect required data for Research and to adopt methods for data collection.	L6
	C3029.5	Interpret the data from research perception.	L6
	C3029.6	Write and present a substantial technical report and document.	L5
BEHAVIOURAL SKILLS AND PROFESSIONAL COMMUNICATION(OE11 6KP)	C3030.1	Communicate with more confidence and self-esteem.	L2
	C3030.2	Give better presentation and explanation using digital aids and tools.	L5
	C3030.3	Perform effectively and efficiently in the work place environment.	L3
	C3030.4	Exhibit better tolerance and receptiveness in understanding and accepting diversity.	L2
	C3030.5	Apply higher thinking order in the self-development process.	L3
	C3030.6	Equip oneself to handle the work related challenges and conflicts professionally.	L5
INTELLECTUAL PROPERTY	C3031.1	Understand the dynamics and legalistic framework of IPR's	L2
	C3031.2	Acquaint with securing patents and its protection.	L5
	C3031.3	Seize the dimensions of Copy right protection.	L2

RIGHTS(OE115KG / OE116KG)	C3031.4	Realize the eminence of Trade Marks in growth of business.	L3
	C3031.5	Essentials of safeguarding Industrial designs.	L1
	C3031.6	Sustentation of Trade Secrets and aspects of IP audit.	L4
MICROPROCESSORS AND MICROCONTROLLERS LAB(PC11649)	C3032.1	Illustrate the assembly language programming.	L1
	C3032.2	Design circuits for various applications using microcontroller.	L3
	C3032.3	Apply the concepts of microcontroller on real- time applications.	L4
	C3032.4	Evaluate the results of 8086 and 8051 programs.	L4
	C3032.5	Use standard test and measurement equipment to evaluate analog/digital interfaces.	L3
	C3032.6	Analyze abstract problems and apply a combination of hardware and software to address the problem.	L6
POWER ELECTRONICS LAB(PC11651)	C3033.1	Correlate theoretical and practical analysis of AC-AC, DC-AC converters	L2
	C3033.2	Analyze AC to DC converters.	L4
	C3033.3	Analyze the characteristics of SCR, MOSFET and IGBT.	L4
	C3033.4	Analyze driving circuit of SCR and commutation circuits.	L4
	C3033.5	Analyze DC-DC converters.	L4
	C3033.6	Analyze cyclo and dual converters	L4
SEMINAR	C3034.1	Search for and collect information on a special topic	L4
	C3034.2	Prepare a report and deliver a presentation.	L4

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POWER SYSTEM PROTECTION(PC117EM)	C401.1	Understand the types of fuses and Circuit breakers	L3
	C401.2	Understand choice of Relays for appropriate protection of power system equipment	L3
	C401.3	Understand various types of Protective devices in Electrical Power systems	L5
	C401.4	Interpret the existing transmission voltage levels and various means to protect the system against over voltages.	L4
	C401.5	Understand various digital protection relays.	L5
	C401.6	Analyze various system protection schemes.	L4
POWER SYSTEM ANALYSIS(PC117EL)	C402.1	Develop Ybus , Zbus matrices for the power system networks	L6
	C402.2	Perform the load flow analysis of power system networks using Gauss-Seidel, Newton-Raphson methods.	L3
	C402.3	Analyze symmetrical and unsymmetrical faults in power system networks	L4
	C402.4	Estimate the Transient and steady state Stability for single machine infinite system.	L5
	C402.5	Apply mathematical techniques/methods to solve economic load dispatch problems.	L3
	C402.6	Model and analyze the single and two area Load frequency control systems for the control of frequency.	L4
ELECTRIC DRIVES(PE117DV)	C403.1	Identify the advantages of drive control over conventional control techniques.	L3
	C403.2	Interpret the basic drive system and its performance.	L2
	C403.3	Classify the drives for different types of loads.	L2
	C403.4	Distinguish the motor behavior during motoring and braking modes.	L4
	C403.5	Compare the speed control of Induction Motor from stator side and rotor side and identify their merits and de-merits.	L4

	C403.6	Explain the performance of the drive during closed loop operation.	L5
PROGRAMMABLE LOGIC CONTROLLERS & THEIR APPLICATIONS(PE117EN)	C404.1	Develop and explain the working of PLC with the help of a block diagram	L2
	C404.2	Execute, debug and test the programs developed for digital and analog operations.	L4
	C404.3	Apply the knowledge of timer/counters with PLCs	L4
	C404.4	Reproduce block diagram representation on industrial applications using PLC.	L5
	C404.5	Understanding to interface various devices to PLCs	L3
	C404.6	Acquire the knowledge of analog devices and their interfacing with PLCs	L3
	ELECTRICAL DISTRIBUTION SYSTEMS(PE117DW)	C405.1	Acquire the knowledge on Coincidence factor, contribution factor, Loss factor and characteristics of load.
C405.2		Design and analyze the substations based on the load, geographical data, ratings of the equipment, number of incoming and outgoing feeders and determine the	L4
C405.3		Design the basic models of distributed generators and their interfacing arrangements with grid for different sources like solar PV, wind , small hydro and	L4
C405.4		Acquire the knowledge on over current protective devices like Fuse, Circuit breaker, Auto-Re-closer and Line sectionalize.	L2
C405.5		Apply the co-ordination procedure on over current protective devices with and without distributed generators included in the distribution system.	L3
C405.6		Apply reactive power compensation techniques in various scenario of the distribution system to limit the voltage drops at the remote ends to the suitable	L3
UTILIZATION OF ELECTRICAL ENERGY(PE117ES)		C406.1	Acquire knowledge about characteristics of various Electric drives
	C406.2	Categorize and analyze different aspects & methods of Utilization of electrical energy from both domestic and industrial point of view.	L3
	C406.3	Identify the type of device/scheme Utilization of Electrical energy for any given application	L6
	C406.4	Design some of the electrical energy Utilization systems namely Heating equipment, Lighting schemes etc.	L2
	C406.5	Apply the concepts of Utilization of Electrical energy in determining the ratings, specifications for different types of services namely traction, heating, illumination	L3

	C406.6	Choose a suitable method for Heating, Welding, Traction and Illumination.	L2
LINE COMMUTATED & ACTIVE RECTIFIERS(PE117EG)	C407.1	Analyze controlled rectifier circuits.	L3
	C407.2	Understand the operation of line-commutated rectifiers-6 pulse and multi-pulse configurations.	L2
	C407.3	Understand the operation of PWM rectifiers-operation in rectification and regeneration modes and lagging, leading and unity power factor mode.	L3
	C407.4	Analyze DC-DC converters.	L4
	C407.5	Analyze flyback converters.	L4
	C407.6	Design of multi-pulse converters.	L4
SMART ELECTRIC GRID(PE117EP)	C408.1	Recite the structure of an electricity market in either regulated or deregulated market conditions.	L1
	C408.2	Understand the advantages of DC distribution and developing technologies in distribution.	L3
	C408.3	Discriminate the trade-off between economics and reliability of an electric power system, differentiate various investment options (e.g.,generation capacities,	L2
	C408.4	Analyze the development of smart and intelligent domestic systems.	L4
	C408.5	Implement the market by framing the factors to influence the customer acceptance and response.	L2
	C408.6	Identify the efficient electric end use alternative technologies.	L4
CYBER SECURITY(OE117KR)	C409.1	Understand the evolution of Internet in the context of emerging Cyber threats and their laws.	L2
	C409.2	Distinguish and classify the forms of Cybercriminal activities and Social Engineering methods used to undertake crimes.	L1
	C409.3	Apply risk management policies to protect organization's critical information and assets.	L3
	C409.4	Analyse the tools and methods used in Cybercrime.	L4
	C409.5	Understand the Security challenges for mobile and wireless devices.	L2

	C409.6	Assess the Cybercrime scenarios in India, Global and Legal perspectives	L5
PYTHON PROGRAMMING (OE117KS)	C4010.1	Gain knowledge on the basic principles of Python programming language.	L1
	C4010.2	Understand different Decision Making statements and Functions.	L2
	C4010.3	Apply the knowledge of data structures like Lists, Dictionaries and sets.	L3
	C4010.4	Understand and summarize different File and exception handling operations.	L2
	C4010.5	Implement object oriented concepts.	L4
	C4010.6	Design GUI applications using Python.	L6
ANDROID PROGRAMMING (OE117KT)	C4011.1	Describe Android platform, Architecture and features.	L1
	C4011.2	Design User Interface and develop activity for Android App.	L6
	C4011.3	Use Intent, Broadcast receivers and Internet services in Android App.	L3
	C4011.4	Design and implement Database Application and Content providers.	L6
	C4011.5	Use multimedia, camera and Location based services in Android App.	L3
	C4011.6	Discuss various security issues in Android platform.	L2
TELECOMMUNICATION SWITCHING SYSTEMS(OE117KU)	C4012.1	Acquire knowledge about Telecommunication Switching Systems.	L1
	C4012.2	Understand different Telecommunication switching and signaling methodologies.	L1
	C4012.3	Apply the concepts to solve the real time telecommunication problems.	L3
	C4012.4	Analyse the fundamental telecommunication traffic models.	L4
	C4012.5	Evaluate telecommunication switching systems.	L5

	C4012.6	Design a telecommunication switching system.	L6
WASTE MANAGEMENT TECHNIQUES AND POWER GENERATION(OE117KV)	C4013.1	Understand technologies for generation of energy from solid waste.	L1
	C4013.2	Compare methods of solid waste disposal.	L2
	C4013.3	Identify sources of energy from waste using various conversion techniques.	L2
	C4013.4	Analyze methods for waste management.	L3
	C4013.5	Assess the harmful effects of e-waste.	L4
	C4013.6	Differentiate between the normal waste and e-waste.	L2
INDUSTRIAL MANAGEMENT (OE117KW)	C4014.1	Organize the activities of Business efficiently.	L3
	C4014.2	Adapt to appropriate method of production yielding productivity.	L6
	C4014.3	Identify efficient method of production.	L3
	C4014.4	Handle inventory efficiently for improving Productivity.	L3
	C4014.5	Implement and maintain Quality standards in Production.	L5
	C4014.6	Cohere to dynamic practices to improve Productivity.	L4
POWER SYSTEMS LAB(PC11760)	C4015.1	Understand operation of CT, PT and Insulator string.	L2
	C4015.2	Understand Different protection relays.	L2
	C4015.3	Understand the process of finding sequence impedance of generator and transformer.	L2
	C4015.4	Understand different fault analysis on generator.	L2
	C4015.5	Understand the formation of ybus and zbus with MATLAB simulation.	L2

	C4015.6	Understand the load flow analysis using GS method and FD method.	L2
INDUSRY ORIENTED MINI PROJECT	C4016.1	Acquire practical knowledge within the chosen area of technology to meet industrial needs.	L3
	C4016.2	Test various electrical & electronic components and design hardware and/or software models for the chosen project.	L6
	C4016.3	Contribute as an individual or team in the development of chosen project.	L2
	C4016.4	Develop effective presentation skills and professional way of documentation.	L3

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ENTREPRENEURSHIP AND PROJECT MANAGEMENT(HS118FK)	C4017.1	Possess sensibleness and skills required for establishment of business.	L3
	C4017.2	Construe the entrepreneurial ingenuity required for business functioning.	L5
	C4017.3	Give perception on the probable business structures for entrepreneurial decisions	L4
	C4017.4	Scrutinize the probable financial propositions in investment process.	L5
	C4017.5	Evaluate the entrepreneurial project feasibility of implementation and its profitability.	L5
	C4017.6	Delve the market for the product developed through entrepreneurial establishment.	L6
GRID INTEGRATION OF RENEWABLE ENERGY SYSTEMS(PE118FN)	C4018.1	Describe the concepts of different renewable energy sources	L1
	C4018.2	Explain the concepts of solar energy conversion systems	L2
	C4018.3	Explain the concepts of wind energy based electricity generation systems	L3
	C4018.4	Describe the utilization of different storage technologies	L4
	C4018.5	Describe the concepts of renewable energy sources like biomass, ocean energy and hydro power generation system	L1
	C4018.6	Analyze the issues involved in the integration of renewable energy sources with the grid.	L4

ADVANCED POWER ELECTRONICS(PE118FA)	C4019.1	Acquire knowledge about analysis and design of various converter topologies Viz. DC- DC converters, Resonant Inverters and Resonant converters.	L3
	C4019.2	Analyze various Multi Level Inverter topologies.	L4
	C4019.3	Analyze various Switch Mode Power Supplies.	L4
	C4019.4	Choose an appropriate converter topology for a particular application.	L3
	C4019.5	Choose a suitable control technique for a given application.	L4
	C4019.6	Apply knowledge acquired to increase the level of inverters.	L2
AI TECHNIQUES IN ELECTRICAL ENGINEERING(PE118FD)	C4020.1	Understand soft commanding methodologies, such as artificial neural networks, Fuzzy logic and genetic Algorithms.	L2
	C4020.2	Develop feed forward neural networks, feedback neural networks and learning techniques.	L4
	C4020.3	Apply fuzzy logic principles in various systems and fuzzy set theory.	L4
	C4020.4	Analyze genetic algorithm, genetic operations and genetic mutations.	L6
	C4020.5	Apply fuzzy logic control in electrical engineering	L4
	C4020.6	Apply genetic algorithms in electrical engineering.	L4
ELECTRICAL MACHINE MODELING & ANALYSIS(PE118FJ)	C4021.1	Apply knowledge of behavior of DC motors to model and analyze for different applications.	L3
	C4021.2	Analyze the characteristics of different types of DC motors to design suitable controllers.	L4
	C4021.3	Acquire knowledge of reference frame theory for AC machines.	L2
	C4021.4	Evaluate the steady state and transient behavior of induction and synchronous machines to propose the suitability of drives for different industrial applications.	L5
	C4021.5	Analyze the 2-Phase induction machines using voltage and current equations to differentiate the behavior and to propose their applications in real world.	L4
	C4021.6	Apply knowledge of 2- axis concept to obtain torque equation of Induction and synchronous motors.	L3

EHV AC TRANSMISSION(PE118FH)	C4022.1	To learn the relative applicational aspects of Bulk Power Transmission through EHV AC Transmission Lines.	L4
	C4022.2	Mathematically Model EHV AC Lines, the Physical phenomena & their Effects on Corona Formation, Audio, Radio, Television Interference caused by EHV Lines.	L5
	C4022.3	Learn the various Measuring Techniques & Testing Procedures applicable to EHV AC Transmission Lines & their Effects Assessment.	L4
	C4022.4	Analyze and Design EHV Systems, using the Travelling Wave Theory & Line Compensation Techniques.	L5
	C4022.5	Learn the various Testing procedures applicable to EHV AC Transmission lines & their effects assessment.	L5
	C4022.6	Analyze and design EHV systems using the Travelling Wave Theory & Line Compensation Techniques.	L4
POWER QUALITY AND FACTS(PE118FV)	C4023.1	Apply various compensation techniques using FACTS devices.	L3
	C4023.2	Acquire knowledge on Multi level converters.	L3
	C4023.3	Apply different Pulse width modulation techniques under different operating conditions.	L3
	C4023.4	Identify the FACTs devices for different applications on system control.	L1
	C4023.5	Acquire knowledge on power quality issues.	L3
	C4023.6	Implement different custom power devices to effectively mitigate the power quality problems.	L6
PRINCIPLES OF ARTIFICIAL INTELLIGENCE(OE118K X)	C4024.1	Understand the basics of AI and knowledge representation using appropriate technique.	L2
	C4024.2	Apply AI techniques for problem solving using various search and game Playing algorithms.	L3
	C4024.3	Interpret architectures of different intelligent agents and Expert Systems.	L2
	C4024.4	Interpret probabilistic and logical reasoning for knowledge.	L2
	C4024.5	Analyse different Machine Learning approaches for problem solving.	L4
	C4024.6	Recognize basics of Natural Language Processing.	L2

CLOUD COMPUTING(OE118KY)	C4025.1	Articulate the main concepts, key technologies, strengths, and limitations of cloud computing.	L2
	C4025.2	Illustrate the broad perceptive of cloud architecture and model.	L2
	C4025.3	Apply and design suitable Virtualization concept.	L3
	C4025.4	Explore some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses	L4
	C4025.5	Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application.	L5
	C4025.6	Analyse the various standards for Cloud computing and its management.	L4
CELLULAR AND MOBILE COMMUNICATIONS(OE118KZ)	C4026.1	Analyze and design wireless and mobile cellular systems.	L4
	C4026.2	Understand impairments due to multipath fading channel.	L1
	C4026.3	Understand the fundamental techniques to overcome the different fading effects.	L1
	C4026.4	Understand Co-channel and Non Co-channel interferences.	L1
	C4026.5	Familiar with cell coverage for signal and traffic, diversity techniques and mobile antennas.	L2
	C4026.6	Understanding of frequency management, Channel assignment, and types of handoff.	L1
ROBOTICS(OE118MA)	C4027.1	Identify a Robot for a specific application.	L2
	C4027.2	Identify parameters required to be controlled in a Robot.	L2
	C4027.3	To select suitable sensors and drive system for an application	L3
	C4027.4	To learn various robot programming methods and languages	L3
	C4027.5	To learn various industrial robot control systems and Mission Vision system	L3
	C4027.6	To understand Socio-Economic aspect of robotisation.	L3

MARKETING MANAGEMENT(OE118M B)	C4028.1	Understand the importance of the Marketing Management Process	L2
	C4028.2	Conduct Marketing Research, comprehend buyer behavior and hypothesize market segmentation.	L4
	C4028.3	Identify the elements of product mix and pricing strategies.	L3
	C4028.4	Enumerate strategies of pricing in fixation.	L5
	C4028.5	Select appropriate network of product distribution.	L3
	C4028.6	Adapt to befitting promotional strategy.	L6
ENVIRONMENTAL IMPACT ASSESSMENT(OE118MC)	C4029.1	Understand the basic concepts of Environmental Impact Assessment, Environmental Impact Statement and Environmental Audit.	L2
	C4029.2	Identify the environmental aspects to be considered for the Environmental Impact Assessment study.	L1
	C4029.3	Apply the knowledge of Environmental Impact Assessment studies in Preparation of Environmental Impact Statement.	L3
	C4029.4	Prepare suitable methodology in Environmental Impact Assessment documentation.	L6
	C4029.5	Analyse and evaluate the mitigation measures of developmental activities on environmental components.	L5
MAJOR PROJECT	C4030.1	Make links across different core areas of knowledge	L3
	C4030.2	Generate ,Develop and evaluate ideas	L3
	C4030.3	Effectively work as a team	L3
	C4030.4	Enhance verbal and writing skills	L3

G. NARAYANAMMA INSTITUTE OF TECHNOLOGY AND SCIENCE (FOR WOMEN)

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE OUTCOMES - BLOOMS TAXANOMY LEVEL MAPPING (M.TECH -GNR-18)

I M.Tech I sem

Subject	CO No	Course outcome	Bloom's taxonomy level
ADVANCED ELECTRIC DRIVES	C101.1	Model and simulate electric drive systems.	L3
	C101.2	Design power electronics converters, for drives application.	L6
	C101.3	Design appropriate current/voltage regulators for electric drives.	L6
	C101.4	Analyze the various speed control methods for drive.	L4
	C101.5	Identify the motors for suitable application.	L3
	C101.6	Evaluate and differentiate between scalar and vector control techniques of induction motor drives	L5
MODELLING AND ANALYSIS OF ELECTRICAL MACHINES	C102.1	Gain Knowledge about the dynamic behavior rotating machines.	L2
	C102.2	Derive & analyze equivalent circuit of synchronous machines.	L4
	C102.3	Understand & apply various practical issues of different machines.	L2
	C102.4	Identify special machines from the perspective of their salient features.	L2
	C102.5	Create dynamic model and analyze 2 asymmetrical induction machine & 1 induction machine.	L6
	C102.6	Distinguish between abc model & dq models of rotating machines	L4
ADVANCED POWER ELECTRONIC CIRCUITS	C103.1	Acquire knowledge about analysis and design of various converter topologies Viz. DC- DC converters etc.,	L1
	C103.2	Analyze of two level converters.	L2
	C103.3	Analyze of multi level inverters.	L2
	C103.4	Apply space vector modulation techniques under different operating conditions.	L3
	C103.5	Apply Knowledge acquired to increase the level of converters.	L3
	C103.6	Achieve hardware implementation of the different types of converters	L6
OPTIMAL AND ADAPTIVE CONTROL	C104.1	Apply the knowledge in the mathematical area of 'calculus of variations' for solving the optimal control problems.	L3
	C104.2	Apply the knowledge of problem formulation, performance measure to engineering control problems with the possibility to do further research in this area	L4
	C104.3	Solve optimal control design problems by taking into consideration the physical constraints on practical control systems	L5
	C104.4	Apply the knowledge of controller design problems to obtain optimal solutions by taking into consideration the limitation on control energy.	L3
	C104.5	Apply the knowledge acquired to develop and utilize modern software tools for design and analysis of optimal control problems.	L5
	C104.6	Extend the knowledge in model reference adaptive control system design to other areas of model-following control.	L3
DYNAMICS OF ELECTRICAL MACHINES	C105.1	Formulate electrodynamic equations of all electric machines and analyze their performance characteristics	L3
	C105.2	Analyze /interpret of transformations for the dynamic analysis of different machines.	L4
	C105.3	Determine stability of the machines under small signal variations and Transient conditions	L5
	C105.4	Formulate and solve the problems related to synchronous machines	L3
	C105.5	Analyze the problems related to DC machines by using linearization and other techniques.	L4
	C105.6	Carry out the dynamic analysis of AC machines under different operating conditions.	L4
STATIC VAR CONTROLLERS AND HARMONIC FILTERING	C106.1	Apply various compensation techniques in FACTS devices	L3
	C106.2	Analyze various static converter control strategies	L4
	C106.3	Identify the FACTS devices for different applications on system control	L1
	C106.4	Analyze / interpret harmonic filtering and design their controllers	L4
	C106.5	Formulate and solve problem related to static compensator	L6
	C106.6	Identify and reduce Harmonics in static compensator through different Harmonic filtering techniques	L1
HVDC	C107.1	Classify HVDC systems, categorize major components employed and applications of HVDC Transmission system	L2
	C107.2	Identify a device and its control scheme for a given application in the HVDC system. viz power control converter control etc.	L2
	C107.3	Design a suitable device like converters, filters and their protection schemes in a HVDC system.	L3

TRANSMISSION	C107.4	Analyze various faults in converter stations and interaction between AC[1]DC systems.	L5
	C107.5	Realize the mathematical model of the HVDC system	L4
	C107.6	Analyze the control methods of the MTDC systems	L6
MODELING OF POWER SEMICONDUCTOR DEVICES	C108.1	Choose the power semiconductor switches based on their characteristics	L3
	C108.2	Design the drive circuits using power semi conductor devices	L5
	C108.3	Model the converter devices & power Semi conductor switches	L6
	C108.4	Control the target systems through appropriate power semiconductor switches.	L3
	C108.5	Design appropriate protective system as per requirement.	L6
	C108.6	Design suitable temperature control system for the devices with heat sinks.	L6
ELECTRIC DRIVES LABORATORY	C109.1	Analyze the DC Motor drive with closed loop control.	L4
	C109.2	Apply the knowledge of 4-Quadrant operation by using choppers.	L3
	C109.3	Use Programmable logic controller for control operations of AC/DC motors.	L5
	C109.4	Apply the concept of Maximum power point tracking system for various stems.	L3
	C109.5	Analyze the performance of 1Ø converters with Inductive Load.	L4
	C109.6	Use the software tools like MATLAB to create and control of typical drive models in the lab	L6
ELELCTRICAL SYSTEMS SIMULATION LAB	C1010.1	Analyze both Single Phase fully controlled Converter and Single Phase Inverter using PWM controller for different loads.	L4
	C1010.2	Carry out stability analysis of a 3rd order system using MATLAB.	L3
	C1010.3	Model & simulate a Separately Excited D.C Motor to study the Dynamic Behavior of the machine for change in Load Torque.	L6
	C1010.4	Assess the Dynamic Behavior of an Induction Motor using Transfer Function approach and State Space approach.	L5
	C1010.5	Use the software tools like SIMULINK, Mi-Power and PSIM and apply the knowledge acquired to carry out Load Flow studies and control of typical drives.	L1
	C1010.6	Apply the knowledge acquired in SIMULINK, Mi-Power and PSIM for analyzing continuous time control Systems	L3
RESEARCH METHODOLOGY AND IPR	C1011.1	Understand research problem formulation.	L2
	C1011.2	Analyze research related information.	L4
	C1011.3	Follow research ethics.	L1
	C1011.4	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.	L2
	C1011.5	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.	L5
	C1011.6	Compose and write quality research reports and attain familiarity with intellectual property rights.	L6
ENGLISH FOR RESEARCH PAPER WRITING	C1012.1	Understand the nuances of research writing	L2
	C1012.2	Write a research paper with required writing skills and be confident to share their writing with others.	L3
	C1012.3	Publish a paper using the requisite standard in a journal	L6
	C1012.4	Review the research papers and articles in a scientific manner.	L5
	C1012.5	Work on citations and ably place them in their research paper.	L3
	C1012.6	Avoid plagiarism and be able to develop their own writing skills in presenting the research work	L2
DISASTER MANAGEMENT	C1013.1	Learn different disasters and measures to reduce the risk due to these disasters	L1
	C1013.2	Learn institutional frame work for disaster management at national as well as global level.	L1
	C1013.3	Develop the capacity to integrate knowledge and to analyze, evaluate and manage the different public health aspects of disaster events at a local and global levels, even when limited information is available	L6
	C1013.4	Demonstrate, describe, analyze and evaluate the environmental, social, cultural, economic, legal and organizational aspects influencing vulnerabilities and capacities to face disasters	L5
	C1013.5	Understand the emergency/disaster management cycle for various types of disasters.	L2
	C1013.6	Develop a basic understanding of prevention, mitigation, preparedness, response and recovery on various types of	L6
PEDAGOGY STUDIES	C1014.1	The pedagogical practices followed by teachers in developing countries both in formal and informal classrooms.	L2
	C1014.2	To examine the effectiveness of pedagogical practices.	L4
	C1014.3	To understand the concept, characteristics and types of educational research and perspectives of research.	L2
	C1014.4	The role of teacher education, school curriculum and guidance materials for effective pedagogy.	L2

PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	C1015.1	Develop their personality and achieve their highest goal of life.	L6
	C1015.2	Lead the nation and mankind to peace and prosperity	L4
	C1015.3	Develop versatile personality.	L6
I M.Tech II sem			
POWER QUALITY	C1016.1	Distinguish causes for power quality issues.	L2
	C1016.2	Interpret the characteristics of voltage sag.	L4
	C1016.3	Understand the equipment behavior with power quality issues.	L2
	C1016.4	Understand harmonics and its effects in power system.	L3
	C1016.5	Compute the mitigation techniques for interruptions and voltage sag	L2
DIGITAL CONTROL OF POWER ELECTRONICS AND DRIVE SYSTEM	C1017.1	Model and simulate power simulation circuits and systems.	L3
	C1017.2	simulate power electronic systems	L3
	C1017.3	Analyse the system response of power electronic systems.	L4
	C1017.4	Simulate the converter fed DC motor drives	L3
	C1017.5	Simulate single phase inverters with thyristors and self-commutated devices.	L3
	C1017.6	Simulate three phase inverters with thyristors and self-commutated devices	L3
SMART GRID	C1018.1	Identify the different technologies for Smart Grid.	L1
	C1018.2	Analyze the architecture and operation of Micro-grids including the common distributed energy sources	L4
	C1018.3	Analyze the Smart transmission as well distribution systems	L4
	C1018.4	Interpret the Power Quality issues associated with grid-connected renewable energy sources and the mitigation techniques deployed.	L3
	C1018.5	Formulate and analyze the power systems problems from the point of view of reliability	L4
	C1018.6	Apply the concepts SCADA and WAMS Technologies towards realizing a better distribution system.	L3
SWITCHED MODE AND RESONANT CONVERTERS	C1019.1	Analyze the principles of operation of push full and forward converters	L4
	C1019.2	Identify various loss components in a switched mode converter and choice of switching frequency with a view towards design of such converters.	L2
	C1019.3	Model existing and modified power converters under small signal perturbations and steady state conditions.	L6
	C1019.4	Analyze and interpret the concepts of resonant converters	L4
	C1019.5	Analyze resonant pulse inverters.	L4
	C1019.6	Apply the concepts acquired to practical and meaningful applications.	L3
ELECTRIC VEHICLE	C1020.1	Acquire and interpret fundamental concepts of advanced batteries and super capacitors.	L2
	C1020.2	Identify various energy conversion devices for vehicle electrification.	L3
	C1020.3	Acquire knowledge on series and parallel connections of EHV.	L3
	C1020.4	Understand the concept of multi quadrant operation of motors.	L2
	C1020.5	Analyze and interpret the concepts of Hybrid vehicles.	L4
	C1020.6	Distinguish between conventional and electric vehicles from the view point of ecological balance of nature.	L4
ADVANCED MICROCONTROLLER BASED SYSTEMS	C1021.1	Program effectively a processor in assembly language and develop an advanced processor based system.	L6
	C1021.2	Configure and use different peripherals in a digital system.	L4
	C1021.3	Compile and debug programs on advanced topics.	L3
	C1021.4	Generate an executable file and use it as a part of compilation of program in assembly language.	L2
	C1021.5	Apply the knowledge obtained to develop the programs for real time applications.	L4
	C1021.6	Apply the concepts of DSP and FPGA for few meaningful applications	L4
DISTRIBUTED GENERATION	C1022.1	Understand the planning and operational issues related to Distributed Generation.	L2
	C1022.2	Acquire Knowledge about Distributed Generation Learn Micro-Grids	L1
	C1022.3	Analyze the De-regulation Impact of DGs upon protective relaying and transient and dynamic stability of existing distribution systems.	L4
	C1022.4	Identify and apply Economic and control aspects of DGs wrt market factors.	L2
	C1022.5	Realize the significance of micro-grids.	L1

	C1022.6	Gain an overall picture of autonomous and non-autonomous grids in the backdrop of prevailing energy scenario	L3
DIGITAL SIGNAL PROCESSORS	C1023.1	Write Assembly Language Programs for the Digital Signal Processors.	L4
	C1023.2	Configure and use Digital Input / Output lines and ADCs	L5
	C1023.3	Configure and use Interrupts for real-time control applications	L4
	C1023.4	Configure and use Event Managers for PWM generation.	L4
	C1023.5	Develop codes for the control of electric drives	L6
	C1023.6	Implement event manager by applying the concepts of Digital Signal Processor.	L5
POWER QUALITY LAB	C1024.1	Analyse the effect of nonlinear loads on Power Quality.	L4
	C1024.2	Carry out remedial analysis for commonly occurring PQ problems like sag & swell.	L4
	C1024.3	Carry out remedial analysis for commonly occurring PQ problems like sag & swell with the help of SIMULIMK & PSCAD.	L4
	C1024.4	Model non-linear loads and estimate Harmonics in industrial distribution system using PSCAD.	L3
	C1024.5	Use the software tools like PSCAD to obtain the current harmonics drawn by power electronics interfaces.	L2
	C1024.6	Analyze the effect of Voltage sag on different electrical equipments	L4
POWER CONVERTERS SIMULATION LAB	C1025.1	Design and conduct simulation and experiments.	L6
	C1025.2	Use the techniques, skills and modern engineering tools necessary for engineering practice.	L2
	C1025.3	Identify, formulate & solve engineering problems with simulation.	L2
	C1025.4	Simulate characteristics of SCR, MOSFET, IGBT.	L3
	C1025.5	Simulate Rectifiers, Choppers, AC voltage controller.	L3
	C1025.6	Simulate and interpret circuits and hardware kits.	L3
MINI PROJECT	C1026.1	Acquire practical knowledge within the chosen area of technology to meet industrial needs.	L2
	C1026.2	Test various electrical & electronic components and design hardware and/or software models for the chosen project.	L4
	C1026.3	Contribute as an individual in the development of chosen project.	L4
	C1026.4	Develop effective presentation skills and professional way of documentation.	L4
SANSKRIT FOR TECHNICAL KNOWLEDGE	C1027.1	Gain knowledge in basic SANSKRIT language	L2
	C1027.2	Understand the ancient SANSKRIT literature about Science & Technology.	L2
	C1027.3	Develop logical and analytical skills.	L6
VALUE EDUCATION	C1028.1	Gain knowledge on self-development.	L2
	C1028.2	Learn the importance of Human Values.	L5
	C1028.3	Develop overall personality	L6
CONSTITUTION OF INDIA	C1029.1	Get the clarity and idea about function of Indian constitution.	L2
	C1029.2	Understand the Rights of equality, the Right of freedom and the Right to constitutional remedies	L2
	C1029.3	Grab the knowledge of union government & their powers and function.	L4
	C1029.4	Understand state and central policies, fundamental duties	L2
	C1029.5	Understand powers and functions of Municipalities, Panchayats and Cooperative Societies	L2
	C1029.6	Understand Electoral Process, special provisions	L2
STRESS MANAGEMENT BY YOGA	C1030.1	Enhance of Physical strength and flexibility.	L5
	C1030.2	Learn to relax and focus.	L3
	C1030.3	Relieve physical and mental tension	L3
	C1030.4	Improve work performance/ efficiency	L3
II M.Tech I sem			
PLCs AND FPGA	C201.1	Apply the knowledge of Boolean algebra for constructing the ladder diagrams	L4
	C201.2	Apply the knowledge of contact-coil logic to real time control problems like Drill Press operation	L4
	C201.3	Solve Industrial control problems by taking into consideration all the constraints including safety of the operating personnel.	L5
	C201.4	Apply the knowledge of timers and counters to obtain better performance of Industrial manufacturing systems.	L3
	C201.5	Apply the knowledge acquired in FPGA's for design of simple logic circuits.	L4
	C201.6	Extend the concepts FPGAs to understand Xilinx processors for different Control logistics.	L3
	C202.1	Acquire knowledge about the fundamental principles of Passive and Active Reactive Power Compensation Schemes at Transmission and Distribution level in Power Systems.	L2

FACTS AND CUSTOM POWER DEVICES	C202.2	Learn various Static VAR Compensation Schemes like Thyristor/GTO Controlled.	L2
	C202.3	Analyze Reactive Power Systems, PWM Inverter based Reactive Power Systems and their controls.	L4
	C202.4	Develop analytical modeling skills needed for modeling and analysis of such static VAR systems	L5
	C202.5	Analyze the different power quality issues.	L4
	C202.6	Implement different controllers to effectively mitigate the power quality problems	L6
	DESIGN OF POWER CONVERTERS	C203.1	Acquire knowledge on hysteresis control.
C203.2		Analyse the concept of Phase to phase transformation.	L4
C203.3		Recognize and use the following concepts and ideas Steady state and transient modeling and analysis of transformers.	L3
C203.4		Understand the concepts of push pull converters.	L2
C203.5		Apply different methods for electrical drive systems.	L3
C203.6		Correlate the design concepts of magnetic circuits with the development of power converters.	L4
BUSINESS ANALYTICS	C204.1	Have a knowledge of data and Analytics	L1
	C204.2	Think critically in making decisions based on data analytics	L4
	C204.3	Identify the befitting descriptive tool required for the business problem.	L3
	C204.4	Identify appropriate prescriptive modeling technique for decision making.	L5
	C204.5	Apply suitable predictive method that supports business decision making	L3
	C204.6	Translate data into clear, actionable insights in the decision making process	L6
INDUSTRIAL SAFETY	C205.1	Know the need for safety in industries	L2
	C205.2	Know about factory acts and industrial safety regulations	L5
	C205.3	Analyse causes and types of different hazards on their preventions	L4
	C205.4	Asses quality maintenance processes and maintenance work quality	L5
	C205.5	Assess safety practices and programs.	L5
	C205.6	Know about periodic and preventive maintenance activities in industries	L5
OPERATIONS RESEARCH	C206.1	Apply linear programming models to several Engineering Applications.	L3
	C206.2	Able to apply concept of non linear programming	L3
	C206.1	In dynamic programming selected models were taught.	L4
	C206.2	Apply simple mathematical models in Inventory into the real Engineering Applications.	L3
	C206.1	Solve Game theory problems related to business applications.	L3
	C206.2	To minimize the waiting time of the customer and optimization of number of servers.	L6
COST MANAGEMENT OF ENGINEERING PROJECTS	C207.1	Perceive the cost associated in managing engineering projects	L2
	C207.2	Prepare budgets for engineering projects	L3
	C207.3	Enumerate and effectively handle the inventory management in reducing the project management cost	L4
	C207.4	Envelope the cost associated in price fixation of the projects	L6
	C207.5	Orient the cost management decision-making using quantitative methodology in minimizing the cost associated with the projects	L5
	C207.6	Furnish effective cost management practices for better handling of engineering projects.	L5
COMPOSITE MATERIALS	C208.1	Learn different composite materials and their applications	L3
	C208.2	Have capacity to integrate knowledge and to analyse, evaluate and manage the different the types of reinforcements.	L4
	C208.3	Develop different types of metal matrix composites and prepare the same for their specific needs as engineers.	L6
	C208.4	Develop different types of ceramic matrix composites and prepare the same for their specific needs as engineers.	L6
	C208.5	Develop different types of polymer matrix composites and prepare the same for their specific needs as engineers.	L6
	C208.6	Critically enhance strength of the composite materials through Lamina usage.	L3
ENERGY FROM WASTE	C209.1	Understand the methods of recycling of waste.	L2
	C209.2	Compare the methods of waste disposal.	L3
	C209.3	Identify different sources of energy from waste.	L3
	C209.4	Analyze methods for management of waste.	L4
	C209.5	Understand the global trade in hazardous waste.	L2
	C209.6	Utilize different sources of energy from waste in an efficient and economical way for practical utilities	L5

POWER FROM RENEWABLE ENERGY SOURCES	C2010.1	Analyse solar thermal and photovoltaic systems and related technologies for energy conversion	L4
	C2010.2	Understand Wind energy conversion and devices available for it	L2
	C2010.3	Understand Biomass conversion technologies, Geo-thermal resources and energy conversion principles and technologies	L3
	C2010.4	Realize Power from oceans (thermal, wave, tidal) and conversion devices	L3
	C2010.5	Understand fundamentals of fuel cells and commercial batteries.	L2
	C2010.6	Suggest suitable methods of power generation for a particular region/ organization based on the availability of resources	L4
II M.Tech II sem			
PROJECT	C2011.1	Make links across different core areas of knowledge	L3
	C2011.2	Generate ,Develop and evaluate ideas	L6
	C2011.3	Effectively work as an individual	L4
	C2011.4	Enhance verbal and writing skills	L4