



# GATES INSTITUTE OF TECHNOLOGY

(Approved by A.I.C.T.E, New Delhi & Affiliated to JNTUA)

## Department of Electrical and Electronics Engineering

Syllabus Regulation: R15

### Course Outcomes

Year & Sem	Course Code	Course Name	Course Outcomes
II – I	15A54301	Mathematics –III	<ol style="list-style-type: none"><li>1. Explain the concepts of matrices and its applications (L2).</li><li>2. Solve algebraic &amp; transcendental equations using appropriate numerical methods (L3).</li><li>3. Analyze a problem using different interpolation formulae (L4).</li><li>4. Construct various types of curves using different numerical techniques (L5).</li><li>5. Find numerical solutions of ordinary differential equations (L1).</li></ol>
II – I	15A02301	Electrical Circuits – II	<ol style="list-style-type: none"><li>1) Analyze the network topology</li><li>2) Measure active and reactive power consumed by a given three phase circuit</li><li>3) Determine the transient response of R-L, R-C, R-L-C circuits for d.c and a.c excitations</li><li>4) Apply Fourier transforms to electrical circuits excited by non-sinusoidal sources</li><li>5) Design different types of filters and circuits simulation</li></ol>
II – I	15A02302	Electrical Machines – I	<ol style="list-style-type: none"><li>1) Explain Electro mechanical Energy conversion for singly excited and multi excited magnetic field systems.</li><li>2) Demonstrate the basic concepts, operation and effects of a DC generator.</li><li>3) Make the use of parallel operation of a DC generator &amp; its characteristics</li><li>4) Make the speed control methods, starters of a DC Motor.</li><li>5) Analyze the methods of testing of DC machines in detail</li></ol>

II – I	15A02303	Control Systems Engineering	<ol style="list-style-type: none"> <li>1. Evaluate the effective transfer function of a system from input to output using (i) block diagram reduction techniques (ii) Mason's gain formula.</li> <li>2. Compute the steady state errors and transient response characteristics for a given system and excitation.</li> <li>3. Determine the absolute stability and relative stability of a system and Draw root loci.</li> <li>4. Draw bode plot, polar plot, nyquist plot and Design a compensator to accomplish desired performance.</li> <li>5. Derive state space model of a given physical system and solve the state equation</li> </ol>
II – I	15A04301	Electronic Devices & Circuits	<ol style="list-style-type: none"> <li>1. Analyze the operating principles of major electronic devices, its characteristics and applications.</li> <li>2. Explain different rectifiers and filters used in power supply section.</li> <li>3. Design and analyze the DC bias circuitry of BJT and FET.</li> <li>4. Explain different stabilization techniques used in transistor amplifiers.</li> <li>5. Design and analyze basic transistor amplifier circuits using BJT and FET.</li> </ol>
II – I	15A05201	Data Structures	<ol style="list-style-type: none"> <li>1. Explain linked list and its application.</li> <li>2. Apply stacks and queues in related applications.</li> <li>3. Analyze trees and graphs.</li> <li>4. Evaluate different sorting techniques.</li> <li>5. Explain various searching methods.</li> </ol>
II – I	15A02305	Electrical Circuits Simulation Laboratory	<ol style="list-style-type: none"> <li>1. Understand and compare basic electric circuit theorems with actual working circuits.</li> <li>2. Design and understand RLC series and parallel circuits and its resonance condition.</li> <li>3. Measure power in three phase circuits in day to day life.</li> </ol>

			4. Understand simulation programs for DC circuit analysis using PSPICE.
II – I	15A04305	Electronic Devices & Circuits Laboratory	<ol style="list-style-type: none"> <li>1. Understand electrical model for various semiconductor devices.</li> <li>2. Learns the practical applications of the semiconductor devices.</li> </ol>
II – II	15A54402	Mathematics – IV	<ol style="list-style-type: none"> <li>1. Explain the concepts of special functions (L2).</li> <li>2. Solve Bessel's functions &amp; apply its properties (l6).</li> <li>3. Identify and solve the problems using Bilinear transforms (L1).</li> <li>4. Evaluate complex integration (L5).</li> <li>5. Use residue theorem to evaluate improper integrals (L3).</li> </ol>
II – II	15A52301	Managerial Economics and Financial Analysis	<ol style="list-style-type: none"> <li>1. Understand the Basics of managerial economics concepts.</li> <li>2. Understand the about the theory of production and cost analysis system.</li> <li>3. Understand the about the markets, business organization and new economic environment system.</li> <li>4. Analyse finance and accounting with ratios.</li> <li>5. Studies about capital and capital budgeting system</li> </ol>
II – II	15A02401	Electrical Machines – II	<ol style="list-style-type: none"> <li>1. Proficiency in construction and analysis of Single Phase Transformers</li> <li>2. Knowledge on Predetermination of Efficiency and Regulation of a transformers</li> <li>3. Proficiency in connections of Three Phase Transformers</li> <li>4. Familiarity with Performance and Design operation of Polyphase Induction Motors</li> <li>5. Understand on starting and speed control of induction motors</li> </ol>

II – II	15A02402	Electrical Power Generating Systems	<ol style="list-style-type: none"> <li>1. Estimate the coal requirement, cost per kWh generation and number of units generated for thermal power station</li> <li>2. Estimate the required flow of river water, cost of generation and number of units generated in hydel power generation</li> <li>3. Evaluate various factors like load factor, plant capacity factor</li> <li>4. Evaluate the tariffs to be charged for the consumers</li> <li>5. Construct the load curve, load duration curve and hence determine the load capacity of the plant</li> </ol>
II – II	15A02403	Electromagnetic Fields	<ol style="list-style-type: none"> <li>1. Understand the concepts of electrostatics.</li> <li>2. Analyze the behavior of dielectrics.</li> <li>3. Acquire the knowledge of magneto statics.</li> <li>4. Analyze the knowledge of magnetic potential.</li> <li>5. Understand the basic concept of Faraday's laws.</li> </ol>
II – II	15A02404	Electrical Machines Laboratory – I	<ol style="list-style-type: none"> <li>1. Conduct experiments to obtain the no-load and load characteristics of D.C. Generators</li> <li>2. Conduct tests on D.C. motors for predetermination of efficiency</li> <li>3. Conduct tests on D.C. motors for determination of efficiency</li> <li>4. Control the speed of D.C. motor in a given range using appropriate method</li> <li>5. Identify the reason as to why D.C. Generator is not building up voltage</li> </ol>
II – II	15A02405	Control Systems & Simulation Laboratory	<ol style="list-style-type: none"> <li>1. Design the controllers/compensators to achieve desired specifications.</li> <li>2. Understand the effect of location of poles and zeros on transient and steady state behavior of systems.</li> <li>3. Assess the performance, in terms of time domain specifications, of first and second order systems.</li> <li>4. Use MATLAB/SIMULINK software for control system analysis and</li> </ol>

			design.
III-I	15A02501	Electrical Measurements	<ol style="list-style-type: none"> <li>1. Understand the basic working principles of measurement of voltages and current.</li> <li>2. Evaluate electrical parameters(R,L&amp;C) by using bridges.</li> <li>3. Apply the knowledge to measure the power and energy.</li> <li>4. Understand the measuring instruments(instrument transformer &amp; potentiometers).</li> <li>5. Analyze about magnetic measurements.</li> </ol>
III-I	15A04509	Linear & Digital IC Applications	<ol style="list-style-type: none"> <li>1. Understand the basic building blocks of linear integrated circuits and its characteristics.</li> <li>2. Analyze the linear, non-linear and specialized applications of operational amplifiers.</li> <li>3. Get the knowledge of various logic families and exposure to VHDL programming.</li> <li>4. Design the digital circuits using VHDL Programming.</li> <li>5. Design various combinational &amp; sequential circuits using various digital integrated IC's.</li> </ol>
III-I	15A02502	Electrical Power Transmission Systems	<ol style="list-style-type: none"> <li>1.Evaluation of transmission line parameters</li> <li>2.Estimate the performance of given transmission line</li> <li>3.Model a given transmission line parameters</li> <li>4.Analyze the effect of over voltages on transmission lines</li> <li>5.Explain the construction, types and grading of underground cable and analyze cable performance</li> </ol>

III-I	15A02503	Power Electronics	<ol style="list-style-type: none"> <li>1. Basic concepts of power semi conductor devices.</li> <li>2. Applying the knowledge of semi conductor devices in power sector like transmission, distribution and utilization.</li> <li>3. Comprehend operation of choppers, converters.</li> <li>4. Understand application of afore said power electronic devices in power sector.</li> <li>5. The competency of power electronics devices &amp; analysis the usage of power electronics device.</li> </ol>
III-I	15A02504	Electrical Machines – III	<ol style="list-style-type: none"> <li>1 Explain the Construction, Principle of operation of Synchronous Machines.</li> <li>2 Predetermine the regulation of synchronous generators using different methods.</li> <li>3 Determine how several alternators running in parallel share the load on the system.</li> <li>4 Analyze the performance characteristics of synchronous motors.</li> <li>5 Choose specific 1-phase motor and/or special motors for a given application.</li> </ol>
III-I	15A04510	Digital Circuits and Systems	<ol style="list-style-type: none"> <li>1. Manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray, and BCD.</li> <li>2. Manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.</li> <li>3. Minimize the given Switching functions in SoP and PoS forms using K-Map.</li> <li>4. Design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.</li> <li>5. Design and analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.</li> </ol>

III-I	15A02506	Electrical Machines Laboratory – II	<ol style="list-style-type: none"> <li>1. Acquires sufficiently good practical knowledge about the operation, testing, and characteristics of transformers, Induction Motors</li> <li>2. Acquires sufficiently good practical knowledge about the operation, testing, and characteristics of Alternators and Synchronous Motors.</li> <li>3. Acquired the knowledge about the fixation of the rating of transformers</li> <li>4. Acquired the knowledge about the fixation of the rating of induction motors and synchronous machines.</li> </ol>
III-I	15A02507	Electrical Measurements Laboratory	<ol style="list-style-type: none"> <li>1. Calibrate various electrical measuring/recording instruments.</li> <li>2. Accurately determine the values of inductance and capacitance using a.c bridges</li> <li>3. Accurately determine the values of very low resistances</li> <li>4. Measure reactive power in 3-phase circuit using single wattmeter</li> <li>5. Determine ratio error and phase angle error of CT</li> </ol>
III-II	15A52601	Management Science	<ol style="list-style-type: none"> <li>1. Illustrate Management Functions, Motivation Theories &amp; Designing of Organization Structure</li> <li>2. Analyze Operations Management &amp; Marketing Management</li> <li>3. Apply Human Resource Management</li> <li>4. Take part in Strategic Management &amp; Project Management</li> <li>5. Summarize the Contemporary Management Practices</li> </ol>
III-II	2. 15A02601	Power Semiconductor Drives	<ol style="list-style-type: none"> <li>1. Explain the solid foundation in controlling method of different electrical appliances.</li> <li>2. Analyze the control dc motor by single phase converter</li> <li>3. Discuss four quadrant operation of dc drives.</li> <li>4. Make use of chopper to control motors.</li> <li>5. Analyze power electronics application in control motors.</li> </ol>

III-II	3. 15A02602	Power System Protection	<ol style="list-style-type: none"> <li>1. Explain the principles of operation of various types of electromagnetic relays, Static relays as well as Microprocessor based relays.</li> <li>2. Analyze the protection of generators and Transformer, determination of what % Generator winding is unprotected under fault occurrence and make design calculations to determine the required CT ratio for transformer protection.</li> <li>3. Apply various types of protective schemes used for feeders and bus bar protection.</li> <li>4. Solve numerical problems concerning the arc interruption and recovery in circuit breakers.</li> <li>5. Explain the different types of over voltages appearing in the system, including existing protective schemes required for insulation co-ordination</li> </ol>
III-II	4. 15A04601	Microprocessors & Microcontrollers	<ol style="list-style-type: none"> <li>1. Illustrate the Concepts of 8086 microprocessor.</li> <li>2. Develop 8086 Assembly level language programs.</li> <li>3. Explain the architecture of Advanced MSP430 microcontrollers.</li> <li>4. Summarize the peripherals of MSP430 Microcontroller.</li> <li>5. Categorize the Serial Communication Protocols.</li> </ol>
III-II	5. 15A02603	Power System Analysis	<ol style="list-style-type: none"> <li>1. Explain the basics and form of Zbus and Ybus of a given power system network.</li> <li>2. Apply computational models for symmetrical and unsymmetrical fault conditions in Electrical power systems.</li> <li>3. Distinguish between different types of buses used in load flow solution.</li> <li>4. Evaluate load flow studies on a given power system.</li> <li>5. Determine the transient stability by equal area criterion and steady state stability limit.</li> </ol>

III-II	15A02604	Neural Networks & Fuzzy Logic	<ol style="list-style-type: none"> <li>1. Understand the Concepts of Artificial Intelligence.</li> <li>2. Acquire the knowledge of Artificial Intelligence Techniques.</li> <li>3. Understand ANN techniques and their concepts.</li> <li>4. Analyze the Role of ANN in various applications.</li> <li>5. Understand Fuzzy logic concepts and its role in various applications.</li> </ol>
III-II	5A04607	Microprocessors & Microcontrollers Laboratory	<ol style="list-style-type: none"> <li>1. Design and implement programs on 8086 microprocessor.</li> <li>2. Design interfacing circuits with 8086.</li> <li>3. Design and implement programs on MSP430.</li> </ol>
III-II	15A02607	Power Electronics & Simulation Laboratory	<ol style="list-style-type: none"> <li>1. Test the turn on –turn off characteristics of various power electronic devices.</li> <li>2. Test and analyze firing circuits for SCRs</li> <li>3. Test different types of voltage controllers, converters and Inverters with R and</li> <li>4. RL loads</li> <li>5. Analyze the TPS7A4901, TPS7A8300 and TPS54160 buck regulators</li> </ol>
IV-I	15A02701	Electrical Distribution Systems	<ol style="list-style-type: none"> <li>1. Compute the various factors associated with power distribution</li> <li>2. Make voltage drop calculations in given distribution networks</li> <li>3. Learn principles of substation Layouts</li> <li>4. Compute power factor improvement for a given system and load</li> <li>5. Understand implementation of SCADA for distribution automation</li> </ol>

IV-I	15A04603	Digital Signal Processing	<ol style="list-style-type: none"> <li>1. Find spectrum of a discrete time signal signals using discrete Fourier series and Discrete Fourier transform. (L-I)</li> <li>2. Develop Fast Fourier Transform (FFT) algorithms for faster computation of Discrete Fourier Transform.(L-III)</li> <li>3. Construct the hardware or software realization structure for a given discrete time system functions.(L-VI)</li> <li>4. Design Digital IIR and FIR filters for the given specification.(L-VI)</li> <li>5. Implement Sampling rate convertor using interpolator and decimator.(L-VI)</li> </ol>
IV-I	15A02702	Power System Operation and Control	<ol style="list-style-type: none"> <li>1 Evaluate the economic operation of power system</li> <li>2 Develop the mathematical models of turbines and governors.</li> <li>3 Discuss the Load Frequency Control methods.</li> <li>4 Explain how shunt and series compensation helps in reactive power control.</li> <li>5 Explain the issues concerned with power system operation in competitive Environment.</li> </ol>
IV-I	15A02703	Utilization of Electrical Energy	<ol style="list-style-type: none"> <li>1. Develop a lighting scheme for a given practical case.</li> <li>2. Analyze the performance of Heating and Welding methods</li> <li>3. Explain the design and operation of electric traction systems.</li> <li>4. Make all numerical calculations associated with electric traction.</li> <li>5. Assess the economic aspects in utilization of electrical energy</li> </ol>
IV-I	15A02706	Energy Auditing & Demand Side Management	<ol style="list-style-type: none"> <li>1. Analyze different types of Energy audit.</li> <li>2. Explain Energy Efficient Motors and need for Power factor Improvement.</li> <li>3. Analyze Good lighting system design and practice.</li> <li>4. Analyze the concept of demand side management.</li> <li>5. Understand the concept of Depreciation and its methods.</li> </ol>

IV-I	15A02708	Flexible AC Transmission Systems	<ol style="list-style-type: none"> <li>1 Explain the various Power flow control issues in transmission lines for the purpose identifying the scope and for selection of specific FACTS controllers.</li> <li>2 Explain the operation and control of voltage source converter and shunt controller.</li> <li>3 Apply concepts of method of shunt compensation by using Shunt compensators.</li> <li>4 Apply concepts of methods of series compensations by using series compensators.</li> <li>5 Design UPFC and IPFC controllers for better transmission of electric power.</li> </ol>
	15A04608	Digital Signal Processing Laboratory	<ol style="list-style-type: none"> <li>1. Find the response of a Linear time invariant discrete time system.</li> <li>2. Analyze the frequency spectrum of a discrete time signal</li> <li>3. Determine the spectrum of a real world signal using Fast Fourier Transform algorithm</li> <li>4. Design real time DSP systems and real world applications.</li> <li>5. Implement DSP algorithms using both fixed and floating point processors</li> </ol>
	15A02710	Power Systems & Simulation Laboratory	<ol style="list-style-type: none"> <li>1. Experimental determination (in machines lab) of sequence impedance and subtransient reactance of synchronous machine</li> <li>2. Conducting experiments to analyze LG, LL, LLG, LLLG faults</li> <li>3. The equivalent circuit of three winding transformer by conducting a suitable experiment.</li> <li>4. Developing MATLAB program for formation of Y,Z buses and gauss-seidel and fast decoupled load flow studies.</li> <li>5. Developing the SIMULINK model for single area load frequency control problem.</li> </ol>

IV-II	15A02801	Instrumentation	<ol style="list-style-type: none"> <li>1 Identify and explain the types of errors occurring in measurement systems.</li> <li>2 Differentiate among types of data transmission and modulation techniques.</li> <li>3 Apply digital techniques to measure voltage, frequency and speed.</li> <li>4 Choose suitable transducers for the measurement of non-electrical quantities.</li> <li>5 Explain the working principles of different signal analyzers and Digital meters</li> </ol>
IV-II	15A02805	Energy Resources & Technology	<ol style="list-style-type: none"> <li>1 Understand different types of sources of energy</li> <li>2 Analyze the generation principles and Environmental Effects of Conventional Power with operation of Thermal, Hydro and Nuclear power sources.</li> <li>3 Analyze the Solar, wind and photo voltaic power sources.</li> <li>4 Understand different types of sources such as Geothermal Energy etc.,</li> <li>5 Understand energy storage and economy in energy Transportation</li> </ol>