E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai

Accredited by NAAC with 'A' Grade | Accredited by NBA

NAGAPATTINAM – 611 002

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

Full Time Curriculum and Syllabus

Third Year – Sixth Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1701MGX02	Industrial Economics	3	0	0	3	40	60	100
1702EE601	Solid State Drives	3	0	0	3	40	60	100
1702EE602	Power System Analysis	3	2	0	4	40	60	100
1702EE603	Microprocessor, Microcontroller and its Applications	3	0	0	3	40	60	100
-	Elective-III	3	0	0	3	40	60	100
-	Elective-III	3	0	0	3	40	60	100
-	Elective-IV (Open Elective)	3	0	0	3	40	60	100
Laboratory Course								
1702EE651	Power Electronics and Drives Laboratory	0	0	4	2	50	50	100
1702EE652	Microprocessor, Microcontroller and its Applications Laboratory	0	0	2	1	50	50	100
1704EE653	Mini Project - II	0	0	2	1	100	0	100
1704EE654	Industrial Visit Presentation	0	0	0	1	100	0	100
1704GE651	Life Skills: Aptitude - II	0	0	2	1	100	0	100

L – Lecture | T – Tutorial | P – Practical | CA – Continuous Assessment | ES – End Semester

1701MGX02	INDUSTRIAL ECONOMICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1. To introduce the concepts of micro, macroeconomic systems and business Decisions in industry.
2. To acquire knowledge on laws of demand & supply and methods of forecasting the Demand.
3. To emphasis the systematic evaluation of the costs, breakeven point for return on economics and diseconomies.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

CO1- Understand the fundamentals of Industrial Economics(K2)

CO2 -Explain about demand and supply in market(K2)

CO3- Calculate the cost involved in production function using Cost Curves (K3)

CO4 –Describe the different market structure involved in economics(K2)

CO5- Summarize the macro economics and financial accounting (K2)

UNIT I INTRODUCTION **9 Hours**

Introduction to Industrial economics- Micro and Macroeconomics - Kinds of Economic Systems - Production Possibility Frontier - Opportunity Cost - Objective of Organizations - Kinds of Organization.

UNIT II DEMAND AND SUPPLY **9 Hours**

Functions of Demand and Supply - Law of diminishing Marginal Utility - Law of Demand and Supply Elasticity of Demand - Demand Forecasting Methods - Indifference curve.

UNIT III PRODUCTION AND COST **9 Hours**

Production Function - Returns to Scale - Law of Variable Proportion - Cost and Revenue concepts and Cost Curves - Revenue curves - Economies and Dis-Economies of scale - Break Evenpoint.

UNIT IV MARKET STRUCTURE **9 Hours**

Market Structure - Perfect Competition - Monopoly - Monopolistic - Oligopoly - Components of Pricing - Methods f Pricing - Capital Budgeting IRR - ARR - NPV - Return on Investment - Payback Period.

UNIT V INTRODUCTION TO MACRO ECONOMICS AND FINANCIAL ACCOUNTING **9 Hours**

National Income - Calculation Methods - Problems - Inflation - Deflation - Business Cycle - Taxes - Direct and Indirect Taxes - Fiscal and monetary policies.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR:

1. Nature and characteristics of Indian Economy.
2. Role and functions of Central bank - LPG - GATT - WTO.

REFERENCES:

1. A Ramachandra Aryasri and V V Ramana Murthy, Engineering Economics and Financial Accounting, Tata McGraw Hill Publishing Company Limited, New Delhi, 2006.
2. R Kesavan, C Elanchezhian and T Sunder Selwyn, Engineering Economics and Financial Accounting, Laxmi Publication Ltd, New Delhi, 2005.
3. V L Samuel Paul and G S Gupta, Managerial Economics Concepts and Cases, Tata McGraw Hill Publishing Company Limited, New Delhi, 1981.
4.S N Maheswari, Financial and Management Accounting, Sultan Chand
5. V L Samuel Paul and G S Gupta, Managerial Economics-Concepts and Cases.
6. Barthwal R.R., Industrial Economics - An Introductory Text Book, New Age.
7. https://nptel.ac.in/courses/110101005/

1702EE601	SOLID STATE DRIVES	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Power Electronics
2. Electrical Machinery – I & II

COURSE OBJECTIVES:

1. To understand the fundamentals of motor load system
2. To explain about power converters fed DC and AC drives
3. To design a controllers for closed loop operation of DC and AC drives

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1 - Explain the dynamics of motor load system and types of load along with their characteristics.

CO2 - Determine speed current voltage and torque of rectifier and chopper fed DC drive in all

CO3 - Calculate the performance parameters of induction motor drives with appropriate power electronics converter in motoring and braking modes.

CO4- Discuss about speed control techniques of VSI, CSI and cycloconverter fed synchronous motor drives.

CO5 -Design a speed & current controller for a closed loop drive system.

UNIT I DRIVE CHARACTERISTICS 8 Hours

Electric drives-classification, elements of electrical drive, equations governing motor load dynamics, torque components; classes of duty; steady state stability; multi quadrant dynamics - acceleration, deceleration, starting and stopping; typical load torque characteristics- Constant torque, torque proportional to speed, fan load, torque inversely proportional to speed; selection of motorrating.

UNIT II DC MOTOR DRIVE 9 Hours

Converter fed drive- review of one and two quadrant converter and its characteristics, steady state analysis of single phase and three phase converter fed separately excited dc motor drive- continuous and discontinuous conduction, four quadrant operation ofconverter.

Chopper fed drive – review of dc chopper and its control strategies, motoring mode, braking mode and four-quadrant operation of chopper fed drive.

UNIT III INDUCTION MOTOR DRIVE 12 Hours

Review of induction motor equivalent circuit and torque speed characteristics; speed control of induction motor drive -stator voltage control, v/f control, VSI fed induction motor drive, cycloconverter control and vector control –block diagram approach; impact of rotor resistance on induction motor speed torque curve, closed loop control of induction motor drive.

UNIT IV SYNCHRONOUS MOTOR DRIVE 8 Hours

V/F &self-control of synchronous motor drive, margin angle control and power factor control, VSI and CSIfed synchronous motor drive -permanent magnet synchronous motor – construction, types, BPLM DC motor and BLPM AC motor.

UNIT V CLOSED LOOP CONTROL OF DC DRIVE 8 Hours

Control structure of dc drive, armature voltage and field control of separately excited dc motor drive; Transfer function of separately excited dc motor and converter, design of controllers – speed controller and current controller.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR:

1. Control of slip ring induction motor drive
2. Space vector modulation technique for induction motor drive

REFERENCES:

1. G.K Dubey, “Fundamentals of Electrical Drives”, 2nd Edition, Narosa Book Distributors, 2010.
2. N. K. De, P. K. Sen, “Electric Drives”, 16th, PHI Learning PVT. LTD.,2014
3. R. Krishnan, “Electric Motor Drives: Modeling, Analysis and Control” Pearson Education,2015
4. Rik De Doncker, Duco W. J. Pulle, Andre Veltman, “Advanced Electrical Drives”, 1st Edition, Springer Science & Business Media2011
5. Bimal K. Bose, “Modern Power Electronics and AC Drives”, 1st Edition, Pearson Education2015
6. R. Krishnan, “Permanent Magnet Synchronous and Brushless DC motor Drives”, CRC Press,2009.
7. https://studentsfocus.com/ee8601-ssd-notes-solid-state-drives-notes-eee-6th-sem/

1702EE602	POWER SYSTEM ANALYSIS	L	T	P	C
		3	2	0	4

PREREQUISITE:

1. Transmission and Distribution
2. Electric circuit analysis

COURSE OBJECTIVES:

1. To model the power system under steady state operating condition. To apply efficient Numerical methods to solve the power flow problem.
2. To model and analyze the power systems under abnormal (or) fault conditions.
3. To model and analyze the transient behavior of power system when it is subjected to a fault.

COURSE OUTCOMES: After completion of the course, Student will be able to

CO1 – Explain the fundamentals of power system with the aid of single line diagram and per unit analysis(K2)

CO2 – Develop power flow models by addressing various power flow problems using iterative techniques(K3)

CO3 – Apply the symmetrical fault calculation methods for the unbalanced network using z bus matrix(K3)

CO4 – Apply the unsymmetrical fault calculation methods for the unbalanced network using sequence network analysis(K3)

CO5 – Make use of power system stability studies for planning and operation of network through various solution techniques(K3)

UNIT I POWER SYSTEM MODEL 12 Hours

Representation of power system components like synchronous machines, induction machines, transformers, transmission lines, loads etc., for steady state analysis - per unit quantities, impedance and reactance diagram - formulation of network matrices for the power systems - bus impedance and bus admittance matrices, reduction techniques on network matrices for network changes – case study.

UNIT II LOAD FLOW ANALYSIS 12 Hours

Importance of power flow analysis in planning and operation of power systems - statement of power flow problem - classification of buses - development of power flow model in complex variables form - iterative solution using Gauss-Seidel method - q-limit check for voltage controlled buses – power flow model in polar form - iterative solution using Newton-Raphson method.

UNIT III SYMMETRICAL COMPONENTS 12 Hours

Definition - introduction - review of symmetrical components - transformation matrices used in resolution of unbalanced voltages and currents - positive, negative and zero sequence networks of power system components - sequence networks of impedance loads, series impedance and rotating machines - representation of various types of faults in sequence networks – case study.

UNIT IV SHORT CIRCUIT ANALYSIS 12 Hours

Formulation of a mathematical model to analyses faults on power system – symmetrical faults – three phase short circuit – unloaded synchronous machine –problem of arcing faults – unsymmetrical faults – system representation – LG, LL and LLG fault – simple problems - effect of fault impedance - use of short circuit study data for relaying and breaking studies – case study of simultaneous faults on the system.

UNIT V STABILITY ANALYSIS 12 Hours

Definition and classification of power system stability – multi machine stability - single machine infinite bus (SMIB) system: development of swing equation - equal area criterion - determination of critical clearing angle and time by using modified Euler method and Runge-Kutta second order method; algorithm
And flow chart.

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR:

1. Load curves
2. Unit commitments

REFERENCES:

1. J. D. Glover, M. Sarma and T. Overbye, "Power System Analysis and Design", Fourth Edition, CENGAGE – Engineering, 2007.
2. HadiSaadat, "Power System Analysis", Second Edition, McGraw Hill Publishers, 2002.
3. Arthur R. Bergen and Vijay Vittal, "Power System Analysis", Third Edition, Prentice Hall of India Private Limited, New Delhi, 2001.
4. John J. Grainger and Stevenson Jr W. D., "Power System Analysis", McGraw Hill, 2003.
5. D. P. Kothari and I. J. Nagrath, "Modern Power System Analysis", Tata McGraw Hill Publishing Company, New Delhi, 2006.
6. T. K. Nagsarkar and M. S. Sukhija, "Power System Analysis" Oxford University Press, New Delhi, 2007.
7. PrabhaKundur, "Power System Stability and Control", Second Reprint Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2006.
8. https://nptel.ac.in/courses/108/105/108105067/

1702EE603	MICROPROCESSOR, MICROCONTROLLER ANDITS APPLICATIONS	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Digital Electronics.
2. Linear Integrated Circuits.

COURSE OBJECTIVES:

1. To study the architecture of commonly used µp and µc.
2. To develop skill in assembly language program writing for 8085, 8086, and its applications.
3. To study the applications of µp and µc based systems.

COURSE OUTCOMES:

After completion of the course, Student will be able to

CO1 Explain the architecture, memory organization, timing diagram and interrupt structure of microprocessor (K2)

CO2 Perform mathematical operation using 8085 & 8051instruction set (K3)

CO3 Explain the architecture, interrupt, memory organization and addressing modes of 8051(K2)

CO4 Practice interfacing of commonly used programmable peripheral devices using 8085 and 8051 (K3)

CO5Make use of 8051 controller for the control of simple electrical systems (K3)

UNITI INTRODUCTION TO8085PROCESSOR 9 Hours

Hardware architecture of 8085, pin outs, functional building blocks of processor; interrupts, memory organization, I/O and memory interfacing.

UNITII 8085INSTRUCTION SET 9 Hours

8085 instruction set-addressing modes, instruction format, assembly language programming using basic instructions- arithmetic operations, ascending and descending order, Fibonacci series etc..

UNITIII 8051MICROCONTROLLERARCHITECTURE 9 Hours

8051 microcontroller- architecture, instruction format, addressing modes; assembly language programming.

UNITIV PERIPHERALINTERFACINGDEVICES 9 Hours

8255-Programmable peripheral interfacing, 8251-serial communication, 8279-programmable keyboard/display controller, 8257-DMA controller, 8253-programmable interval timer.

UNITV APPLICATIONSOFMICROCONTROLLER 9 Hours

Washing machine controller; stepper motor control; D/A & A/D interfacing with 8051.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR:

1. A case study on applications of microcontrollers in automotive field.
2. Arduino/ARM processor based applications

REFERENCES:

1. R S. Gaonkar, “Microprocessor Architecture Programming and Application”, Prentice hall, New Delhi, fifth edition 2002.
2. Sunil Mathur, “Microprocessor 8085 and its Interfacing” Prentice hall India learning private limited, New Delhi, second edition, 2011.
3. Muhammad Ali Mazidi, Janice GilliMazidi and R.D. Kinely “The 8051 Micro Controller and Embedded Systems”, PHI Pearson Education, fifth Indian Reprint,2003.
4. Soumitra Kumar Mandal, Microprocessor & microcontroller Architecture, programming & interfacing using 8085, 8086, 8051, Tata McGraw Hill Education,2013
5. Krishna Kant, “Microprocessor and Microcontrollers”, Eastern Company Edition, Prentice-Hall of India, New Delhi, Second edition.
6. https://nptel.ac.in/courses/108/105/108105102/

1702EE651	POWER ELECTRONICS AND DRIVES LABORATORY	L	T	P	C
		0	0	4	2

PREREQUISITE:

1. Power Electronics
2. Electrical Machinery – I &II

COURSE OBJECTIVES:

1. To determine the characteristics of power electronic devices.
2. To design a power converter for electrical drives.
3. To analyze the performance of power converter fed drives.

COURSE OUTCOMES:

After completion of the course, Student will be able to

CO1 Construct experiments on power electronic component for obtaining characteristics curve (K3)

CO2 Make use of half-controlled converter for DC motor (K3).

CO3 Identify the characteristic plot of IGBT based PWM inverter (K3)

CO4 Infer the operation of AC voltage controller and Switched mode power converter (K3)

CO5 Make use of Simulation of PE circuits (K3)

LIST OF EXPERIMENTS:

1. Gate Pulse Generation using R, RC and UJT.
2. Characteristics of SCR and TRIAC
3. Characteristics of MOSFET and IGBT
4. AC to DC half controlled converter fed DC Motor
5. AC to DC fully controlled Converter fed DC Motor
6. Step down and step up MOSFET based choppers
7. IGBT based single phase PWM inverter
8. IGBT based three phase PWM inverter fed three phase AC Motor
9. AC voltage controller
10. Switched mode power converter
11. Simulation of PE circuits (1Φ & 3Φ semiconverter,1Φ & 3Φ full converter, DC-DC converters)

ADDITIONAL EXPERIMENTS / INNOVATIVE EXPERIMENTS:

1. Simulation of closed loop speed control of DC motor drive
2. Simulation of closed loop speed control of AC motor drive

REFERENCES:

1.K. Nandakumar,R. Anandaraj, “power electronics and drives laboratory Manual”, 2018
2.Krishnan.R, “Electric Motor and Drives Modeling, Analysis and Control”, Prentice Hall of India, 2001.
3. Lab manual prepared by course instructor.
4. Pillai, S.K., “A First Course on Electrical Drives”, Wiley Eastern Limited, 1993.

1702EE652	MICROPROCESSOR, MICROCONTROLLER ANDITS APPLICATIONS LABORATORY	L	T	P	C
		0	0	2	1

PREREQUISITE:

1. Analog and Digital Integrated Circuits Laboratory
2. Microprocessor, Microcontroller And Its Applications

COURSE OBJECTIVES:

1. To provide training on programming of microprocessors and microcontrollers and understand the interface requirements.
2. To provide training on programming of microcontrollers.
3. To understand the requirements of interfacing.

COURSE OUTCOMES:

After completion of the course, Student will be able to

CO1 Perform mathematical operations and control instructions using 8085 processor (K3)
CO2 Practice interfacing of commonly used programmable peripheral interfaces using 8085(K3)
CO3 Perform arithmetical operations using 8051 microcontroller (K3)
CO4 Practice interfacing of commonly used programmable peripheral interfaces using 8051(K3)
CO5 Develop assembly language program to control simple electrical system using 8085, 8051(K3)

LIST OF EXPERIMENTS:

1. Simple arithmetic operations using 8085: addition / subtraction / multiplication/division.
2. Programming with control instructions: Ascending / descending order, maximum / minimum of numbers.
3. Programming with control instructions: Hex / ASCII / BCD code conversions.
4. Interface experiments with8085: A/D interfacing& D/A interfacing.
5. Interfacing of Serial communication using8085.
6. Interfacing of Keyboard and display interface using8085.
7. Simple arithmetic operations using 8051: addition / subtraction / multiplication/division.
8. Programming of I/O port with8051.
9. Study of stepper motor using 8085.
10. Study of dc motor using8085.

TOTAL: 30 HOURS

ADDITIONAL EXPERIMENTS / INNOVATIVE EXPERIMENTS:

1. Programming of Traffic light controller using8085.
2. Programming of 8259 using8085.

REFERENCES:

1. S.Latha, “Microprocessor and microcontroller laboratory Manual”,2018.
2. Microprocessor 8085 lab manual by G.T .Swamy, Laxmi publication, first edition,2006.
3. Microprocessor Lab Manual, Rajesh Hegde, Kindleedition.

1704EE653	MINI PROJECT II	L	T	P	C
		0	0	2	1

GUIDELINE FOR REVIEW AND EVALUATION

The students may be grouped into 2 to 4 and work under a project supervisor. The device / system / component(s) to be designed and developed using modeling software, may be decided in consultation with the supervisor and if possible with an industry. A project report to be submitted by the group and the soft copy of the report, which will be reviewed and evaluated for internal assessment by a Committee constituted by the Head of the Department. At the end of the semester examination, the project work is evaluated based on oral presentation and the project report examined by the internal examiner constituted by the Head of the Department.

Total: 30 Hours

1704EE654	INDUSTRIAL VISIT PRESENTATION	L	T	P	C
		0	0	0	1

In order to provide the experiential learning to the students, shall take efforts to arrange at least two industrial visit / field visits in a year. A presentation based on Industrial visits shall be made in this semester and Suitable credit may be awarded.

1704GE651	LIFE SKILLS: APTITUDE -II	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

1. To brush up problem solving skill and to improve intellectual skill of the students.
2. To be able to critically evaluate various real life situations by resorting to Analysis of key issues and factors.
3. To be able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
4. To enhance analytical ability of students.
5. To augment logical and critical thinking of Students.

UNIT I PARTNERSHIP, MIXTURES AND ALLEGATIONS, PROBLEM ON AGES, SIMPLE INTEREST, COMPOUND INTEREST **6 Hours**

Introduction Partnership - Relation between capitals, Period of investments and Shares- Problems on mixtures - Allegation rule - Problems on Allegation – Problems on ages - Definitions Simple Interest - Problems on interest and amount - Problems when rate of interest and time period are numerically equal - Definition and formula for amount in compound interest - Difference between simple interest and compound interest for 2 years on the same principle and time period.

UNIT II BLOOD RELATIONS, , CLOCKS, CALENDARS **6 Hours**

Defining the various relations among the members of a family - Solving Blood Relation puzzles - Solving the problems on Blood Relations using symbols and notations - Finding the angle when the time is given - Finding the time when the angle is known - Relation between Angle, Minutes and Hours - Exceptional cases in clocks - Definition of a Leap Year - Finding the number of Odd days - Framing the year code for centuries - Finding the day of any random calendar date.

UNIT III TIME AND DISTANCE, TIME AND WORK **6 Hours**

Relation between speed, distance and time - Converting kmph into m/s and vice versa - Problems on average speed - Problems on relative speed - Problems on trains - Problems on boats and streams - Problems on circular tracks - Problems on races - Problems on Unitary method - Relation between Men, Days, Hours and Work - Problems on Man-Day-Hours method - Problems on alternate days - Problems on Pipes and Cisterns.

UNIT IV DATA INTERPRETATION AND DATA SUFFICIENCY **6 Hours**

Problems on tabular form - Problems on Line Graphs - Problems on Bar Graphs - Problems on Pie Charts - Different models in Data Sufficiency - Problems on data redundancy

UNIT V ANALYTICAL AND CRITICAL REASONING **6 Hours**

Problems on Linear arrangement - Problems on Circular arrangement - Problems on Double line-up - Problems on Selections - Problems on Comparisons - Finding the Implications for compound statements - Finding the Negations for compound statements- Problems on assumption - Problems on conclusions - Problems on inferences - Problems on strengthening and weakening of arguments.

TOTAL: 30 HOURS

REFERENCES:

1. Arun Sharma, „How to Prepare for Quantitative Aptitude for the CAT‟, 7thedition, McGraw Hills publication, 2016.
2. ArunSharma, „How to Prepare for Logical Reasoning for CAT‟, 4thedition, McGraw Hills publication, 2017.
3. R S Agarwal, „A modern approach to Logical reasoning‟, revised edition, S. Chand publication, 2017.
4. R S Agarwal, „Quantitative Aptitude for Competitive Examinations‟ revised edition, S. Chand Publication, 2017.
5. Rajesh Verma, “Fast Track Objective Arithmetic”, 3rd edition, Arihant publication, 2018.
6. B.S. Sijwalii and Indu Sijwali, “A New Approach to REASONING Verbal & Non-Verbal”, 2nd edition, Arihnat publication, 2014.

1703EE006	DIGITAL SIGNAL PROCESSING	L	T	P	C
		3	0	0	3

PREREQUISITE:

Electric circuit theory
Linear algebra

COURSE OBJECTIVES:

After completion of the course, Student will be able to

1. To classify signals and systems & their mathematical representation (K2)
2. To learn discrete Fourier transform properties and its computation (K2)
3. Make use of the characteristics of IIR filter to design of IIR filters for filtering Undesired signals (K3)
4. Make use of the characteristics of IIR filter to design of IIR filters for filtering Undesired signals (K3)
5. To study about a programmable Digital signal processor (K2)

UNIT I SIGNALS AND SYSTEMS 9 Hours

Basic elements of DSP – concepts of frequency in Analog and Digital Signals – sampling theorem – Discrete – time signals, systems – Analysis of discrete time LTI systems – Z transform – Convolution– Correlation.

UNIT II DISCRETE FOURIER TRANSFORM 9 Hours

Introduction to DFT – Properties of DFT – Filtering methods based on DFT – FFT Algorithms – Decimation in time Algorithms,Decimation in frequency Algorithms – Use of FFT in Linear Filtering.

UNIT III IIR FILTER DESIGN 9 Hours

Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design byImpulse Invariance, Bilinear transformation, Approximation of derivatives – (LPF, HPF, BPF, BRF)filter design using frequencytranslation.

UNIT IV FIR FILTER DESIGN 9 Hours

Structures of FIR – Linear phase FIR filter – Fourier Series - Filter design using windowing techniques(Rectangular Window, Hamming Window, Hanning Window), Frequency sampling techniques – Finiteword length effects in digital Filters: Errors, Limit Cycle, Noise Power Spectrum.

UNIT V DIGITAL SIGNAL PROCESSORS 9 Hours

Introduction – TMS320c5X Architecture – Features – Addressing Formats – Functional modes - Introduction to Commercial DSP Processors –TMS320C64XX, TMS320 C54X.

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR:

Finite word length effects, Multirate Signal Processing, Adaptive filtering

REFERENCES:

1. J.G. Proakis and D.G. Manolakis, „Digital Signal Processing Principles, Algorithms and Applications", Pearson Education, New Delhi, PHI. 2003.
2. S.K. Mitra, „Digital Signal Processing – A Computer Based Approach", McGraw Hill Edu, 2013.
3. Robert Schilling & Sandra L.Harris, Introduction to Digital Signal Processing using Matlab", Cengage Learning, 2014.
4. B.Venkataramani and M.Bhaskar, "Digital Signal Processors – Architecture, Programming and Applications" – Tata McGraw – Hill Publishing Company Limited. New Delhi, 2003.
5. R. Lakshmi Rekha, "Digital Signal Processing" – ALR Publications – 2016.
6. http://www.ti.com/processors/dsp/overview.html

1703EE009	POWER SYSTEM TRANSIENTS	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Transmission and Distribution.
2. Power Electronics.

COURSE OBJECTIVES:

1. To study the generation of switching transients and their control.
2. To study the mechanism of lighting strokes and travelling waves.
3. To compute the transients in travelling waves &integrated power system

COURSE OBJECTIVES:

After completion of the course, Student will be able to

CO1- Understand about the causes, types and effects of transients (K2)
CO2 –Investigate the phenomenon of switching transients and its effect (K3)
CO3 - Investigate the phenomenon of lightning transients and its effect (K3)
CO4 – Compute the transient response of travelling waves on transmission line (K3)
CO5 – Discuss the transients in integrated power system (K2)

UNIT I INTRODUCTION AND SURVEY OF TRANSIENTS 9 Hours

Review and importance of the study of transients , causes for transients; RL circuit transient with sine wave excitation ; double frequency transients ; different types of power system transients - effect of transients on power systems ,role of the study of transients in system planning.

UNIT II SWITCHING TRANSIENTS 9 Hours

Over voltages due to switching transients - resistance switching, load switching, normal and abnormal switching transients; current suppression, current chopping; capacitance switching-capacitance switching with a restrike, with multiple restrikes. Illustration for multiple restriking transients; ferro resonance.

UNIT III LIGHTNING TRANSIENTS 9 Hours

Review of the theories in the formation of clouds and charge formation; rate of charging of thunder clouds; mechanism of lightning discharges and characteristics of lightning strokes; model for lightning stroke; factors contributing to good line design - protection from lightning.

UNIT IV TRAVELING WAVES ON TRANSMISSION LINE 9 Hours

Computation of transients; transient response of systems with series and shunt lumped parameters and distributed lines ;traveling wave concept -step response, Bewely's lattice diagram; standing waves and natural frequencies; reflection and refraction of travellingwaves.

UNIT V TRANSIENTS IN INTEGRATED POWER SYSTEM 9 Hours

The short line and kilometric fault ;distribution of voltages in a power system; line dropping and load rejection ; voltage transients on closing and reclosing lines ; over voltage induced by faults; switching Surges on integrated system; qualitative application of EMTP for transient computation.

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR:

1. Analysis Power System Transient Using Wavelet Transform.
2. Case Study about the Effect of transients developed in Home appliances.

REFERENCES:

1. Allan Greenwood, "Electrical Transients in Power Systems", Wiley Inter Science, New York, 2nd Edition, 2010.
2. PritindraChowdhari, "Electromagnetic transients in Power System", John Wiley and Sons Inc., 2nd Edition, 2009.
3. Indulkar.C.S, Kothari.D.P, Ramalingam.K, „Power System Transients – A statistical approach", PHI Learning Private Limited, 2nd Edition, 2010.
4. Ramanujam.R, "Computational Electromagnetic Transients: Modeling, Solution Methods and Simulation"I K International Publishing House Pvt. Ltd, 2014.
5. Sakis Meliopoulis.A.P, "Power System Grounding and Transients: An Introduction "CRC Press; 1st Edition 2015
6. https://nptel.ac.in/courses/108105104/