Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electrical & Electronics Engineering

B. Tech. (EEE) VII SEMESTER

S. No.	Category-Course Code	Course Title	Scheme of Instruction			Contact hr/week	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
Theory									
1	PC-4101EE	Power System Analysis	3	1	0	4	30	70	4
2	**Professional Elective-III**		3	0	0	3	30	70	3
	PE-4102EE	Flexible AC Transmission System							
	PE-4103EE	Industrial Electrical Systems							
	PE-4104EE	Power System Reliability							
3	**Professional Elective-IV**		3	0	0	3	30	70	3
	PE-4105EE	Digital Control System							
	PE-4106EE	HVDC Transmission System							
	PE-4107EE	Power Quality Engineering`							
4	**Open Elective-I**		3	0	0	3	30	70	3
	OE-4108HS	Disaster Management							
	OE-4109EC	Computer Organization							
	OE-4110EC	Digital Signal Processing							
	OE-4111EC	VLSI Design							
Practical									
5	PC-4112EE	Power Systems Laboratory	0	0	2	2	25	50	1
6	PC-4113EE	Power Electronics and Drives Laboratory	0	0	2	2	25	50	1
7	PW-4114EE	Project Stage-I	0	0	2	2	50	--	1
	Total		**12**	**1**	**6**	**19**	**220**	**380**	**16**

L : Lectures
T : Tutorials
P : Practical's
CIE : Continuous Internal Evaluation
SEE : Semester End Examination
PC : Professional Core
HS : Humanities and Social Sciences

Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electrical & Electronics Engineering

PC-4101EE- POWER SYSTEMS ANALYSIS

Credits:4

Class: **B.Tech VII Semester** *Lectures*: **3**, *Tutorial*:**1**

Branch: **EEE** *CIE*: **30 Marks**

Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

NETWORK TOPOLOGY: Introduction, Elementary graph theory – oriented graph, tree, co-tree, basic cut-sets, basic loops; Incidence matrices – Element-node, Bus incidence, Branch-path incidence matrix, Basic cut-set, Augmented cut-set, Basic loop and Augmented loop; Primitive network – impedance form and admittance form.

UNIT – II

NETWORK MATRICES: Introduction, Formation of Y_{BUS} matrix– by method of inspection (including transformer off-nominal tap setting), by method of singular transformation; Formation of Bus Impedance Matrix by step by step building algorithm

UNIT - III

LOAD FLOW STUDIES: Introduction, Power flow equations, Classification of buses, Operating constraints, Data for load flow; Gauss-Seidal Method – Algorithm and flow chart for PQ and PV buses (numerical problem for one iteration only), Acceleration of convergence; Newton Raphson Method – Algorithm and flow chart for NR method in polar coordinates (numerical problem for one iteration only); Algorithm for Fast Decoupled load flow method; Comparison of Load Flow Methods.

UNIT-IV

SHORT CIRCUIT ANALYSIS: Assumptions in short circuit analysis — Symmetrical short circuit analysis using Thevenin's theorem — Bus Impedance matrix building algorithm (without mutual coupling) — Symmetrical fault analysis through bus impedance matrix — Post fault bus voltages Symmetrical components — Sequence impedances and networks — Analysis of unsymmetrical faults at generator terminals: LG, LL and LLG — Unsymmetrical Fault Analysis: Fault current calculations for LG, LL, LLG faults with and without fault impedance, Numerical Problems

UNIT –V

TRANSIENT STABILITY STUDIES: Numerical solution of Swing Equation – Point-by-point method, Modified Euler‟s method, Runge-Kutta method, Milne‟s predictor corrector method. Representation of power system for transient stability studies – load representation, network performance equations. Solution techniques with flow charts.

TEXT BOOKS:

1. John J.Grainger and Stevenson.W.D, “Power System Analysis”, Tata McGraw Hill, 2003.
2. Wadhwa.C.L, “Electrical Power Systems”, New Age International Private Limited, 2009.
3. Stagg.C.W and Elabiad.A.H, “Computer Methods in Power System Analysis”, Tata McGraw Hill International Book Company, 1990.

REFERENCE BOOKS

1. Hadi Saadat, “Power System Analysis”, Tata McGraw Hill, 2002 .
2. Duncan Glover, Mulukutla.J, Sarma.S and Thomas J. Overbye, “Power System Analysis and Design”, Cengage Learning, 4th Edition, 2009.
3. Nagrath I.J and Kothari D.P, “Modern Power System Analysis”, Tata McGraw Hill, 4th Reprint, 2011.
4. Kundur P, “Power System Stability and Control”, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th Reprint 2010.
5. Pai M A, “Computer Techniques in Power System Analysis”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2nd Edition, 2007.

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KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electrical & Electronics Engineering

PE-4102EE-FLEXIBLE AC TRANSMISSION SYSTEMS

Credits:3

Class: **B.Tech VII Semester** *Lectures*: **3**, *Tutorial*:**0**

Branch: **EEE** *CIE*: **30 Marks**

Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT – I

FACTS Concepts: Transmission interconnections power flow in an AC system, loading capability limits, Dynamic stability considerations, importance of controllable parameters, basic types of FACTS controllers, and benefits from FACTS controllers.

UNIT – II

Static Shunt Compensation: Objectives of shunt compensation, midpoint voltage regulation, voltage instability prevention, improvement of transient stability, Power oscillation damping, Methods of controllable var generation, variable impedance type static var generators, switching converter type var generators and hybrid var generators.

UNIT – III

SVC and STATCOM: SVC: FC-TCR and TSC-TCR. STATCOM: The regulation and slope, var reserve control. Comparison between SVC and STATCOM

UNIT – IV

Static Series Compensators: Objectives of Series compensation, concept of series capacitive compensation, GTO thyristor-controlled series capacitor (GCSC), thyristor switched series capacitor (TSSC), thyristor-controlled series capacitor (TCSC) control schemes for GCSC TSSC and TCSC, and operation of SSSC

UNIT – V

Advanced Facts Controllers: Unified Power flow controller (UPFC) - Interline power flow controller (IPFC) - Unified Power quality conditioner (UPQC).

TEXT BOOKS:
1. "N.G. Hingorani and L. Guygi", Understanding FACTS Devices, IEEE Press Publications 2000.
2. "Yong- Hua Song, Allan Johns", Flexible AC Transmission System, IEE Press 1999.
REFERENCE BOOKS:
1. "Kalyan K. Sen and Meylingsen", Introduction to FACTS Controllers, John wiley& sons, Inc., Mohamed E. EI – Hawary Series editor, 2009.
2. "K. R Padiyar, Motilal", FACTS controllers in power transmission and distribution UK Books of India 2007.

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Department of Electrical & Electronics Engineering

PE-4103EE-INDUSTRIAL ELECTRICAL SYSTEMS

Credits:3

Class: **B.Tech VII Semester** *Lectures*: **3**, *Tutorial*: **0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

ELECTRICAL SYSTEM COMPONENTS

LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safetypractices

UNIT-II

RESIDENTIAL AND COMMERCIAL ELECTRICAL SYSTEMS

Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing of components.

UNIT-III

ILLUMINATION SYSTEMS

Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premises, flood lighting.

UNIT-IV

INDUSTRIAL ELECTRICAL SYSTEMS I

HT connect ion, industrial substation, Transformer select ion, Industrial loads, motors, starting of motors, SLD, Cable and Switchgear selection, Lightning Protection, Earthing design, Power

factor correction – kVAR calculations, type of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panelcomponents.

UNIT-V

INDUSTRIAL ELECTRICAL SYSTEMS II

DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks.

TEXT BOOKS:

1. S.L.UppalandG.C.Garg,"ElectricalWiring,Estimating&costing",Khannapublishers,2008.
2. K. B. Raina, "Electrical Design, Estimating & Costing", New age International,2007.

REFERENCES:

1. S. Singh and R. D. Singh, "Electrical estimating and costing", Dhanpat Rai and Co.,1997.
2. Web site for IS Standards.
3. H. Joshi, "Residential Commercial and Industrial Systems" , McGraw Hill Education,2008.

Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electrical & Electronics Engineering

PE-4104EE-POWER SYSTEM RELIABILITY

Credits:3

Class: **B.Tech VII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

BASIC PROBABILITY THEORY

Elements of probability, probability distributions, Random variables, Density and Distribution functions- Binomial distribution- Expected value and standard deviation - Binomial distribution, Poisson distribution, normal distribution, exponential distribution, Weibull distribution.

DEFINITION OF RELIABILITY: Definition of terms used in reliability, Component reliability, Hazard rate, derivation of the reliability function in terms of the hazard rate. Hazard models - Bath tub curve, Effect of preventive maintenance. Measures of reliability: Mean Time to Failure and Mean Time between Failures.

UNIT-II

GENERATING SYSTEM RELIABILITY ANALYSIS

Generation system model – capacity outage probability tables – Recursive relation for capacitive model building – sequential addition method – unit removal – Evaluation of loss of load and energy indices – Examples. Frequency and Duration methods – Evaluation of equivalent transitional rates of identical and non-identical units – Evaluation of cumulative probability and cumulative frequency of non-identical generating units – 2-level daily load representation - merging generation and load models – Examples.

UNIT-III

OPERATING RESERVE EVALUATION

Basic concepts - risk indices – PJM methods – security function approach – rapid start and hot

reserve units – Modeling using STPM approach.

BULK POWER SYSTEM RELIABILITY EVALUATION:

Basic configuration – conditional probability approach – system and load point reliability indices – weather effects on transmission lines – Weighted average rate and Markov model – Common mode failures.

INTER CONNECTED SYSTEM RELIABILITY ANALYSIS

Probability array method – Two inter connected systems with independent loads – effects of limited and unlimited tie capacity - imperfect tie – Two connected Systems with correlated loads – Expression for cumulative probability and cumulative frequency.

UNIT-IV

DISTRIBUTION SYSTEM RELIABILITY ANALYSIS

Basic Techniques – Radial networks –Evaluation of Basic reliability indices, performance indices – load point and system reliability indices – customer oriented, loss and energy-oriented indices – Examples. Basic concepts of parallel distribution system reliability

UNIT-V

SUBSTATIONS AND SWITCHING STATIONS

Effects of short-circuits - breaker operation – Open and Short-circuit failures – Active and Passive failures – switching after faults – circuit breaker model – preventive maintenance – exponential maintenance times.

TEXT BOOKS:

1. ReliabilityEvaluationofPowersystemsbyR.Billinton,R.N.Allan,BSPublications,2007.
2. ReliabilityModelinginElectricPowerSystemsbyJ.Endrenyi,JohnWileyandSons,1978

REFERENCES:

1. Reliability Engineering: Theory and Practice by Alessandro Birolini, Springer Publications.
2. An Introduction to Reliability and Maintainability Engineering by Charles Ebeling, TMH Publications.
3. Reliability Engineering by E. Balaguru swamy, TMH Publications.
4. Reliability Engineering by Elsayed A. Elsayed, Prentice Hall Publications.

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Department of Electrical & Electronics Engineering

PE-4105EE-DIGITAL CONTROL SYSTEM

Credits:3

Class: **B.Tech VII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I
DISCRETE REPRESENTATION OF CONTINUOUS SYSTEMS

Basics of Digital Control Systems. Discrete representation of continuous systems. Sample and hold circuit. Mathematical Modeling of sample and hold circuit. Effects of Sampling and Quantization. Choice of sampling frequency. ZOH equivalent.

UNIT-II
DISCRETE SYSTEM ANALYSIS

Z-Transform and Inverse Z Transform for analyzing discrete time systems. Pulse Transfer function. Pulse transfer function of closed loop systems. Mapping from s-plane to z plane. Solution of Discrete time systems. Time response of discrete time system.

STABILITY OF DISCRETE TIME SYSTEM

Stability analysis by Jury test. Stability analysis using bilinear transformation. Design of digital control system with dead beat response. Practical issues with dead beat response design.

UNIT-III

STATE SPACE APPROACH FOR DISCRETE TIME SYSTEMS

State space models of discrete systems, State space analysis. Lyapunov Stability. Controllability, reach- ability, Reconstructibility and observability analysis. Effect of pole zero cancellation on the controllability &observability.

UNIT-IV

DESIGN OF DIGITAL CONTROL SYSTEM

Design of Discrete PID Controller, Design of discrete state feedback controller. Design of set point tracker. Design of Discrete Observer for LTI System. Design of Discrete compensator.

UNIT-V

DISCRETE OUTPUT FEEDBACK CONTROL

Design of discrete output feedback control. Fast output sampling (FOS) and periodic output feedback controller design for discrete time systems.

TEXT BOOKS:

1. K. Ogata, “Digital Control Engineering”, Prentice Hall, Englewood Cliffs,1995.
2. M. Gopal, “Digital Control Engineering”, Wiley Eastern,1988.

REFERENCES:

1. G. F. Franklin, J. D. Powell and M. L. Workman, “Digital Control of Dynamic Systems”, Addison- Wesley,1998.
2. B.C. Kuo, “Digital Control System”, Holt, Rinehart and Winston,1980.

Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electrical & Electronics Engineering

PE-4106EE-HVDC TRANSMISSION SYSTEM

Credits:3

Class: **B.Tech VII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

BASIC CONCEPTS Necessity of HVDC systems, Economics and Terminal equipment of HVDC transmission systems, Types of HVDC Links, Apparatus required for HVDC Systems, Comparison of AC and DC Transmission, Application of DC Transmission System, Planning and Modern trends in D.C. Transmission.

ANALYSIS OF HVDC CONVERTERS: Choice of Converter Configuration, Analysis of Graetz circuit, Characteristics of 6 Pulse and 12 Pulse converters, Cases of two 3 phase converters in Y/Y mode-their performance.

UNIT-II

CONVERTER AND HVDC SYSTEM CONTROL

Principle of DC Link Control, Converters Control Characteristics, Firing angle control, Current and extinction angle control, Effect of source inductance on the system, Starting and stopping of DC link, Power Control.

REACTIVE POWER CONTROL IN HVDC: Introduction, Reactive Power Requirements in steady state, sources of reactive power-Static VAR Compensators, Reactive power control during transients.

UNIT-III

POWER FLOW ANALYSIS IN AC/DC SYSTEMS

Modelling of DC Links, DC Network, DC Converter, Controller Equations, Solution of DC load flow. System for DC quantities, solution of AC-DC Power flow-Simultaneous method-Sequential method.

UNIT-IV

CONVERTER FAULTS AND PROTECTION

Converter faults, protection against over current and over voltage in converter station, surge arresters, smoothing reactors, DC breakers, Audible noise, space charge field, corona effects on DC lines, Radio interference.

UNIT-V

HARMONICS

Generation of Harmonics, Characteristics harmonics, calculation of AC Harmonics, Non- Characteristics harmonics, adverse effects of harmonics, Calculation of voltage and Current harmonics, Effect of Pulse number on harmonics

FILTERS: Types of AC filters, Design of Single tuned filters –Design of High pass filters.

TEXT BOOKS:

1. "K. R. Padiyar", HVDC Power Transmission Systems: Technology and system Interactions, New Age International (P) Limited, and Publishers,1990.
2. "S K Kamakshaiah, V Kamaraju", HVDC Transmission , TMH Publishers,2011

REFERENCES:

1. "S. Rao", EHVAC and HVDC Transmission Engineering and Practice, Khanna publications, 3rd Edition1999.
2. "Jos Arrillaga", HVDC Transmission, The institution of electrical engineers, IEE power& energy series 29, 2nd edition1998.
3. "E. W. Kimbark", Direct Current Transmission, John Wiley and Sons, volume 1,1971.
4. "E. Uhlmann", Power Transmission by Direct Current, B. S. Publications,2009

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KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electrical & Electronics Engineering

PE-4107EE-POWER QUALITY ENGINEERING

Credits:3

Class: **B.Tech VII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT – I

Introduction: Introduction of the Power Quality (PQ) problem, Terms used in PQ: Voltage, Sag, Swell, Surges, Harmonics, over voltages, spikes, Voltage fluctuations, Transients, Interruption, overview of power quality phenomenon, Remedies to improve power quality, power quality monitoring.

UNIT – II

Long & Short Interruptions: Interruptions – Definition – Difference between failures, outage, Interruptions – causes of Long Interruptions – Origin of Interruptions – Limits for the Interruption frequency – Limits for the interruption duration – costs of Interruption – Overview of Reliability evaluation to power quality, comparison of observations and reliability evaluation.
Short interruptions: Definition, origin of short interruptions, basic principle, fuse saving, voltage magnitude events due to re-closing, voltage during the interruption, monitoring of short interruptions, difference between medium and low voltage systems. Multiple events, single phase tripping – voltage and current during fault period, voltage and current at post fault period, stochastic prediction of short interruptions.

UNIT – III

Single and Three Phase Voltage Sag Characterization: Voltage sag – definition, causes of voltage sag, voltage sag magnitude, and monitoring, voltage sag calculation in non-radial systems, meshed systems, and voltage sag duration. Three phase faults, phase angle jumps, magnitude and phase angle jump for three phase unbalanced sags, load influence on voltage sags.

UNIT – IV

Power Quality Considerations in Industrial Power Systems: Voltage sag – equipment behaviour of Power electronic loads, induction motors, synchronous motors, computers, consumer electronics, adjustable speed AC drives and its operation. Mitigation of AC Drives, adjustable speed DC drives and its operation, mitigation methods of DC drives.

UNIT – V

Mitigation of Interruptions & Voltage Sags: Overview of mitigation methods – from fault to trip, reducing the number of faults, reducing the fault clearing time changing the power system, installing mitigation equipment, improving equipment immunity, different events and mitigation methods. System equipment interface – voltage source converter, series voltage controller, shunt controller, combined shunt and series controller.

TEXT BOOKS:

1. “Math H J Bollen”, “Understanding Power Quality Problems” , IEEE Press, 2000.
2. “R. Sastry Vedam and Mulukutla S. Sarma”, “Power Quality VAR Compensation in Power Systems”, CRC Press, 2008.

REFERENCE BOOKS:

1. C. Sankaran, Power Quality, CRC Press 2001.
2. Roger C. Dugan, Mark F. Mc Granaghan, Surya Santoso, H. Wayne Beaty, Electrical Power Systems Quality, Tata McGraw Hill Education Private Ltd, 3rd Edition 2012.

Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electrical & Electronics Engineering

OE-4108HS-DISASTER MANAGEMENT

Credits:3

Class: **B.Tech VII Semester** *Lectures*: 3, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT – I

Introduction & Principles of Disaster Management: Nature - development, hazards and disasters; natural disasters - earth quakes, floods, fire, landslides, cyclones, tsunamis, nuclear; chemical dimensions and typology of disasters - public health disasters, national policy on disaster management

UNIT –II

Prevention Preparedness and Mitigation Measures: Prevention, preparedness & mitigation measures for various disasters, post disaster reliefs and logistics management, emergency support functions and their coordination mechanism, resources and material management, management of relief camp

UNIT– III

Risk and Vulnerability: Building codes and land use planning, social vulnerability, environmental vulnerability, macroeconomic management and sustainable development, climate change, risk rendition, financial management of disaster and related losses

UNIT - IV

Role of Technology in Disaster Management: Disaster management for infrastructures, taxonomy of infrastructure, treatment plants and process facilities, electrical sub stations, roads and bridges, geo spatial information in agriculture, drought assessment, multimedia technology in disaster risk management and training

UNIT-V

Disaster management in India: Disaster Profile of India – Mega Disasters of India and Lessons Learnt Disaster Management Act 2005 – Institutional and Financial Mechanism National Policy on Disaster Management, National Guidelines and Plans on Disaster Management;

Suggested Readings:

1. Rajib shah and R.R Krishnamurthy, *Disaster management – Global Challenges and local solutions, Hyderabad*: Universities Press (India) Pvt. Ltd., 2009.
2. Satish Modh, *Introduction to Disaster management*, Bengaluru: Macmillan India Ltd., 2010

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OE-4109EC-COMPUTER ORGANIZATION

Credits:3

Class: **B.Tech VII Semester** *Lectures*: 3, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

CPU Organization: Common bus structure, Arithmetic, Logic and Shift Unit using multiplexer, Register, Instructions, Design of CPU.

UNIT-II

Data Path Design: Fixed-Point Arithmetic: Addition, Subtraction, Multiplication:Booth‟s algorithms, Division - Restoring and Non- restoring algorithms, floating point arithmetic and BCD Adder, Shifter: Barrel shifter and Logarithmic shifter,

UNIT-III

Control Design: Basic concepts, Hardwired Control unit design approach: classical and one-hot methods, Micro-programmed Control unit approach: basic concept, micro-program sequencer.

UNIT-IV

Memory and System Organization: Memory Organization: Memory hierarchy, Main memory: RAM, ROM, DRAM, Associative memory, cache memory: principles, address mapping techniques,

UNIT-V

System Organization: communication methods, IO and system control: Programmed IO, DMA and interrupts and Input-Output Processor (IOP)
Advances in Computer Organization: Reduced Instruction Set Computer (RISC): characteristics and architecture, parallel processing, pipeline mechanism

Suggested Reading:

1. Morris Mano M, *Computer System Architecture*, 3rd edition, Prentice Hall India,2007.
2. William Stallings, *Computer Organization and Architecture, Design for Performance*, 7th edition, Prentice Hall India, 2006.
3. John P. Hayes, *Computer Architecture and Organization*, 3rd edition, McGraw Hill,1998.

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Department of Electrical & Electronics Engineering

OE-4110EC-DIGITAL SIGNAL PROCESSING

Credits:3

Class: **B. Tech VII Semester** *Lectures*: 3, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

Introduction: Review of Discrete Time Fourier Transform, Concept of frequency in continuous and discrete time signals, DFT and its properties, linear convolution, circular convolution. Computational complexity of direct Computation of DFT, Fast Fourier Transform, DIT and DIF, FFT algorithms for RADIX-2 case

UNIT-II

FIR Filters: FIR digital filter design techniques. Properties of FIR digital filters, design of FIR filters using windows and frequency sampling techniques, linear phase characteristics.

UNIT-III

IIR Filters: Analog filter design – Butterworth and Chebyshev approximations, IIR digital filter design techniques, impulse invariant technique. Bilinear transform technique. Comparison of FIR and IIR filters, frequency transformations.

UNIT- IV

Multirate signal processing: Introduction, decimation by a factor D, interpolation by a factor I, sampling rate conversion by a rational factor I/D, application of Multirate signal processing.

UNIT-V

DSP Processors: Introduction to Fixed point Digital Signal Processors, TMS 320C54XX processor- architecture, addressing modes, Applications of DSP processors.

Suggested Readings:

1. John G.Proakis and Dimitris G. Manolakis, *"Digital Signal Processing principles, Algorithms and Applications"*, 3rd Edition, Prentice-Hall of India Private Limited, New Delhi, 1997.
2. Alan V. Oppenheim and Ronald W. Schafer," Discrete *Time Signal Processing*", 3rd edition, Prentice Hall, Upper Saddle River, NJ,2010
3. Sanjit K. Mitra, "*Digital Signal Processing: A Computer-Based Approach*", 4/e, McGraw-Hill, New York,2011
4. Avatar sing and S.Srinivasan, *"Digital Signal Processing implementation using DSP Microprocessors with Examples from TMS320C54XX"*, Thomson Books Icole, 2004.

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OE-4111EC-VLSI DESIGN

Credits:3

Class: **B.Tech VII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT –I

Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS &BiCMOS
Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: I_{ds}-V_{ds} relationships, MOS transistor threshold Voltage, g_m, g_{ds}, Figure of merit ω_o; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT -II

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2 μm CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

UNIT –III

Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out, Choice of layers.

UNIT -IV

Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.
Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories.

UNIT -V

Programmable Logic Devices: PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach, Parameters influencing low power design.
CMOS Testing: CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques, Contemporary Topics.

TEXT BOOKS:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, EshraghianDougles and A. Pucknell, PHI, 2005Edition
2. CMOS VLSI Design – A Circuits and Systems Perspective, Neil H. E Weste, David Harris, Ayan Banerjee, 3rd Ed, Pearson,2009.
3. VLSI Design – M. Michael Vai, 2001, CRCPress

REFERENCEBOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press,2011
2. CMOS logic circuit Design - John .P. Uyemura, Springer,2007.
3. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition,1997.
4. VLSI Design- K .Lal Kishore, V. S. V. Prabhakar, I.K International,2009.
5. Introduction to VLSI – Mead & Convey, BS Publications,2010.

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electrical & Electronics Engineering

PC-4112EE- POWER SYSTEMS LAB

Credits:1

Class: **B.Tech VII Semester** *Practical*: **2**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **25 Marks**
Duration of SEE: **3 hours** *SEE*: **50 Marks**

List of Experiments:

1. Performance characteristics of 3-phase transmission line model
2. Determination A B C D parameters of 3-phase transmission line model
3. IDMT Characteristics of an over current (Electromagnetic) Relay
4. Differential protection of single-phase transformer
5. Determination of positive, negative, zero sequence impedances of 3-phase transformers.
6. Determination of positive, negative, zero sequence impedances of 3-phase Alternator.
7. Transient Stability analysis using MATLAB Simulink
8. Fault analysis on an un-loaded 3-phase Alternator.
9. Load Frequency control of single area system using MATLAB Simulink.
10. Load Frequency control of two area system using MATLAB Simulink.
11. Formation of Y_{BUS}.
12. Load Flow Analysis using Gauss Seidal (GS)Method.
13. Load Flow Analysis using Fast Decoupled (FD)Method.
14. Formation of Z_{BUS}.
15. Simulation of Compensated Line
16. Operating characteristics of Directional Over Current Relay

NOTE: Perform any 10 experiments from above list of experiments

TEXT BOOKS:

1. C.L. Wadhwa: Electrical Power Systems –Third Edition, New Age International Pub. Co.,2001.
2. Hadi Sadat: Power System Analysis –Tata Mc Graw Hill Pub. Co.2002.

REFERENCES:

1. D. P. Kothari: Modern Power System Analysis-Tata Mc Graw Hill Pub. Co. 2003.

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Department of Electrical & Electronics Engineering

PC-4113EE-POWER ELECTRONICS AND DRIVES LAB

Credits:1

Class: **B.Tech VII Semester**
Branch: **EEE**
Duration of SEE: **3 hours**

Practical: **2**, *Tutorial*:**0**
CIE: **25 Marks**
SEE: **50 Marks**

Any eight experiments should be conducted

1. Study of Characteristics of SCR, MOSFET &IGBT,
2. Single Phase AC Voltage Controller with R and RLLoads
3. Single Phase half controlled &fully controlled bridge converter with R and RLloads
4. Forced Commutation circuits (Class A, Class B, Class C, Class D & ClassE)
5. Single Phase Cyclo-converter with R and RLloads
6. Single Phase Bridge inverter with R and RLloads
7. Simulation of 1-phase fully-controlled and half-controlled rectifier fed separately excited DC motor
8. Simulation of open loop or closed loop speed control of 3-phase induction motor using V/f control and using sine PWM

Any two experiments should be conducted from the following

9. DC Jones chopper with R and RLLoads
10. Three Phase half controlled bridge converter withR-load
11. Single Phase dual converter with RLloads
12. (a)Simulation of single-phase Half wave converter using R and RL loads

    (b)Simulation of single-phase full converter using R, RL and RLE loads

    (c)Simulation of single-phase Semi converter using R, RL and RLE loads
13. (a)Simulation of Single-phase AC voltage controller using R and RL loads

    (b)Simulation of Single phase Cyclo-converter with R andRL-loads
14. Simulation of Buck chopper
15. Simulation of single phase Inverter with PWMcontrol
16. Simulation of three phase fully controlled converter with R and RL

loads, with and without freewheeling diode. Observation of waveforms for Continuous and Discontinuous modes of operation.

17. Simulation of closed loop speed control of DC motor with different control schemes (PID, hysteresis current control, Fuzzy, ANFIS etc)
18. Design and simulation of buck, boost and buck-boost converters
19. Simulation of Dual Converter – 4 quadrant operation – separately excited DC motor
20. Simulation of Regenerative Braking – Bidirectional Power Transfer
21. Simulation of Switched Mode Rectifiers – keeping load voltage constant irrespective of line and load variations – closed loop circuit simulation

Text Book:

1. L. Umanand, Power Electronics – Essentials & Applications, Wiley-India.
2. Mohan, Undeland, Robbins, Power Electronics, Converters, Applications & Design, Wiley-India.
3. Muhammad H. Rashid, Power Electronics Circuits, Devices and Applications, Pearson Education.

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electrical & Electronics Engineering

B. Tech. (EEE) VII Semester

PC-4114EE- PROJECT STAGE-1

Credits: 1

The department can initiate the project allotment procedure at the end of VI semester and finalize it in the first two weeks of VII semester.

The department will appoint a project coordinator who will coordinate the following:

Collection of project topics/descriptions from faculty members (Problems can also be invited from the industries)
Grouping of students (max 3 in a group) Allotment of project guides.

The aim of project work is to develop solutions to realistic problems applying the knowledge and skills obtained in different courses, new technologies and current industry practices. This requires students to understand current problems in their domain and methodologies to solve these problems. To get awareness on current problems and solution techniques, the first 4 weeks of VII semester will be spent on special lectures by faculty members, research scholars, postgraduate students of the department and invited lectures by engineers from industries and R&D institutions. After completion of these seminars each group has to formalize the project proposal based on their own ideas or as suggested by the project guide.

Seminar schedule will be prepared by the coordinator for all the students from the 5th week to the last week of the semester which should be strictly adhered to.

Each group will be required to:

1. Submit a one-page synopsis before the seminar for display on notice board.
2. Give a 30 minutes presentation followed by 10minutes discussion.
3. Submit a technical write-upon the talk.

At least two teachers will be associated with the Project Seminar to evaluate students for the award of sessional marks which will be on the basis of performance in all the 3 items stated above.

Theseminarpresentationshouldincludethefollowingcomponentsoftheproject:

1. Problem definition and specification
2. Literature survey
3. Broad knowledge of available techniques to solve a particular problem.
4. Planning of the work, preparation of bar (activity) charts
5. Presentation-oral and written.