Chhattisgarh Swami Vivekanand Technical University, Bhilai

Scheme of Teaching and Examination

M.Tech. (DIGITAL ELECTRONICS) in the Department of Electronics & Telecommunication

III SEMESTER

S.No	Board of Study	Subject Code	Subject Name	Periods per week			Scheme of Exam			Total Marks	Credit L+(T+P)/2
				L	T	P	Theory/Practical				
							ESE	CT	TA		
1	Electronics & Telecom	555311 (28)	Digital Coding Techniques	3	1	-	100	20	20	140	4
2	Refer Table – III		Elective –III	3	1	-	100	20	20	140	4
3	Electronics & Telecom	555321 (28)	Preliminary Project	-	-	15	100	-	100	200	8
	Electronics & Telecom	555322 (28)	Seminar based on Dissertation	-	-	3	-	-	20	20	2
Total				**6**	**2**	**18**	**300**	**40**	**160**	**500**	**18**

L-Lecture, T- Tutorial, P- Practical, ESE- End Semester Examination, CT- Class Test, TA- Teacher's Assessment

Table – III		
Elective – III		
Board of Study	**Code**	**Subject**
Electronics & Telecom	555331 (28)	Network Modulling
Electronics & Telecom	555332 (28)	Neural Network and Application
Electronics & Telecom	555333 (28)	ASIC Design
Electronics & Telecom	555334 (28)	Digital Switching Systems

Note (1) – **1/4th of total strength of students subject to minimum of twenty students is required to offer an elective in the college in a Particular academic session .**

Note (2) – **Choice of elective course once made for an examination cannot be changed in future examinations.**

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, Bhilai

Semester: **M.E. III Sem.** Branch: **Electronics & Telecom**
Subject: **Digital Coding Techniques** Code: **555311 (28)**
Total Theory Periods: **40** Total Tut Periods: **12**
Total Marks in end Semester Exam.: **100**
Minimum number of class tests to be conducted: **02**

UNIT – I
Information Theory: Introduction. Uncertainty, Information and entropy. Source-coding Theorem, Huffman Coding: Prefix coding, Lempel-Ziv coding. Discrete memoryless channels, mutual information: channel capacity. channel coding theorem. Information capacity theorem, differential entropy. Shannon's theorem.

UNIT – II
Coding Techniques: Error Control Coding, Linear block Codes, Generator Matrix. Parity check matrix. Perfect codes. Hamming codes, Optimal Linear codes. Syndrome. Group Theory. Maximum distance separable codes.

UNIT – III
Coding Schemes: Cyclic codes, method for generating cyclic: codes, matrix description of cyclic codes, Burst error correction, Fire codes, CRC codes, Convolution codes. Tree codes and trellis Codes, analytical representation, decoding Convolution codes.

UNIT – IV
Cryptographic techniques: Introduction to cryptography; cryptographic protocols, hash function. key management. communication using public key cryptography, secret key algorithm, digital signatures, keys management, encryption algorithms, Block Cipher, Transposition Cipher. Multiple encryption, stream cipher, RSA algorithm, data encryption standard, cryptanalysis.

UNIT – V
Data Compression: Introduction, lossless Compression, lossy compression, measure of performance, modeling and coding, adaptive Huffman coding, Shannon-Fano algorithm, arithmetic coding, predictive coding, vector quantization, statistical modeling, Adaptive modeling, Highest-order modeling, dictionary-based compression, Sliding window compression.

Text Books:
- Ranjan Bose, Fundamentals of Information Theory, Coding and Cryptography
- R.B. Wells, Applied Coding & Information Theory for Engineers, Prentice-Hall
- Khalid Sayood, Introduction to Data Compression

Reference Books:
A. **Burr, Modulation & coding for wireless communications Prentice-Hall**
- J.G. Proakis & M. Salehi, Communication systems engineering Prentice-Hall
- T. Cover and J. Thomas, Elements of Information Theory, , Wiley- Interscience.
- Shu Lin & D.J. Costello, Jr. Error control coding Prentice-Hall
- S. Haykin & M. Moher, Modern wireless communications Prentice-Hall
- Bruce Schneier, Applied Cryptography Protocols Algorithm and Source code in C, John Wiley & Sons.
- Nelson M, The Data Compression Book

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Semester: **M.E. III Sem.** Branch: **Electronic & Telecom.**
Subject: **Network Modulling** Code: **555331 (28)**
Total Theory Periods: **40** Total Tut Periods: **12**
Total Marks in end Semester Exam.: **100**
Minimum number of class tests to be conducted: **02**

UNIT - I
SYSTEM MODELS AND ROLE OF SIMULATION: Basic concepts and nomenclature, Types of system-Deterministic, stochastic, continuous and discrete systems, System simulation-Uses of simulation and its limitations, Steps in simulation studies.

UNIT - II
STATISTICAL TOOLS: Generation and testing of pseudorandom numbers, Random variety generation for Uniform, Exponential, Normal and Poisson distributions, Sampling and Estimation (Maximum likelihood estimation, Confidence interval estimation),Discrete Event Simulation : Representation of time, Approaches to discrete event simulation, Queuing models-Single and multiserver queues, Steady state behaviors of queues, Network of queues, Inventory system simulation, Programming languages for discrete event system simulation-GPSS, SIMSCRIPT (Brief Overview).

UNIT - III
MODELING AND PERFORMANCE EVALUATION OF COMPUTER SYSTEMS: Behavioral, Data flow and structural modeling, Overview of Hardware Modeling and Simulation using VHDL, VHDL Description for design reuse, test generation and fault simulation for behavioral model. Single service center models, Central server models, models of interactive systems, use of VHDL in front-end and back-end system development. Evaluation of multiprocessor systems, workload characterization & Benchmarks.

UNIT-IV
CONTINUOUS SYSTEM SIMULATION: Continuous system models-Open and closed loop systems, Models described by differential equations, Systems dynamics (Growth and decay models, Systems dynamics diagram), Simulations of aircraft models, Biological and sociological systems simulation, Simulation languages overview-CSMP.

UNIT-V
VIRTUAL REALITY MODELING: Overview of virtual reality modeling language VRML 2.0, Creating dynamic worlds, Integrating JavaScript's with VRML, Verification and Validation of Simulation Models : Goals of model verification and validation, Input data analysis, Output analysis, Sensitivity analysis, Hypothesis testing, Performance measures and their estimation.

Text Books:
1. Discrete System Simulation, Clifs & New Jersey, Prentice Hall

Reference Books:
1. System Simulation, G.Gordon, Cliffs, Prentice Hall
2. Computer Systems Performance Evaluation , D. Ferrari, Prentice Hall

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, Bhilai

Semester: **M.E. III Sem.** Branch: **Electronic & Telecom.**
Subject: **Neural Network and Applications** Code: **555332 (28)**
Total Theory Periods: **40** Total Tutorial Periods: **12**
Total Marks in end Semester Exam.: **100**
Minimum number of class tests to be conducted: **02.**

UNIT - I
Biological, Analogy, Architecture classification, Neural Models, Learning Paradigm and Rule, single unit mapping and the perception.

UNIT – II
Feed forward networks – Review of optimization methods, back propagation, variation on back propagation, FFANN mapping capability, Mathematical properties of FFANN's Generalization, Bios & variance Dilemma, Radiol Basis Function networks. Recurrent Networks – Symmetric hopfield networks and associative memory, Boltzmann machine, Adaptive Resonance Networks

UNIT - III
PCA, SOM, LVQ, Hopfield Networks, Associative Memories, RBF Networks, Applications of Artificial Neural Networks to Function Approximation, Regression, Classification, Blind Source Separation, Time Series and Forecasting.

UNIT – IV
Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation. Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

UNIT – V
Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.Uncertainty based Information: Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets. Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks. Application of Fuzzy Logic: Medicine, Economics etc.

Text Books:

1. Haykin S., "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.
2. Fuzzy Sets & Fuzzy Logic, G.J. Klir & B. Yuan, PHI, 1995.

Reference Books:

1. Anderson J.A., "An Introduction to Neural Networks", PHI, 1999.
2. Hertz J, Krogh A, R.G. Palmer, "Introduction to the Theory of Neural Computation", Addison-Wesley, California, 1991.
3. Cherkassky V., F. Kulier, "Learning from Data-Concepts, Theory and Methods", John Wiley, New York, 1998.
4. Patterson D.W., "Artificial Neural Networks: Theory and Applications", Prentice Hall, Singapore, 1995.
5. Artificial Neural Networks, B. Yegnanarayana, PHI.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, Bhilai

Semester: **M.E. III Sem.** Branch: **Electronic & Telecom.**
Subject: **ASIC Design** Code: **555333 (28)**
Total Theory Periods: **40** Total Tutorial Periods: **12**
Total Marks in end Semester Exam.: **100**
Minimum number of class tests to be conducted: **02.**

UNIT – I
Introduction to ASICs: - Types of ASICs - Design flow - CMOS logic: CMOS transistors CMOS Design rules - Combinational Logic Cell -Sequential logic cell - Data path logic cell I/O cells - ASIC library design: Transistors as Resistors - Transistor Parasitic Capacitance-Logical effort.

UNIT - II
Programmable ASICs: - Anti fuse - static RAM - EPROM and EEPROM technology practical issues - Programmable ASIC logic cells : Actel ACT - Xilinx LCA - Altera FLEX - Altera MAX. Programmable ASIC I/O cells : DC & AC inputs and outputs - Clock & Power inputs - Xilinx I/O blocks.

UNIT – III
Programmable ASIC interconnect: Actel ACT -Xilinx LCA - Xilinx EPLD - Altera MAX 5000 and 7000 - Altera MAX 9000 - Altera FLEX. Programmable ASIC design software : Design systems - Logic Synthesis - Half gate ASIC. Low level design entry : Schematic entry - Low level design language - PLA tools - EDIF- CFI design representation.

UNIT – IV
Logic synthesis: Verilog and logic synthesis -VHDL and logic synthesis. Simulation: types of simulation. : Testing: boundary scan test fault simulation - automatic test pattern generation.

UNIT – V
ASIC construction: System partition - FPGA partitioning - partitioning methods - Floor planning and placement: floor planning - placement - physical design flow. Routing : global routing - detailed routing - special routing - circuit extraction - DRC.

Text book:
1. M.J.S .Smith, - Application - Specific Integrated Circuits Pearson Education -1997.

Reference Books:

- Andrew Brown, - VLSI Circuits and Systems in Silicon -, McGraw Hill, 1991.
- S.D. Brown, R.J. Francis, J. Rox, Z.G. Uranesic, "Field Programmable Gate Arrays" –
- Kluever Academic Publishers, 1992.
- Mohammed Ismail and Terri Fiez, "Analog VLSI Signal and Information Processing",
- McGraw Hill, 1994.
- S. Y. Kung, H. J. Whilo House, T. Kailath, " VLSI and Modern Signa l Processing ",
- Prentice Hall, 1985.
- Jose E. France, Yannis Tsividis, " Design of Analog - Digital VLSI Circuits for
- Telecommunication and Signal Processing", Prentice Hall, 1994.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, Bhilai

Semester: **M.E. III Sem.** Branch: **Electronic & Telecom.**
Subject: **Digital Switching Systems** Code: **555334 (28)**
Total Theory Periods: **40** Total Tutorial Periods: **12**
Total Marks in end Semester Exam.: **100**
Minimum number of class tests to be conducted: **02.**

UNIT – I
Digital Switching Systems (DSS) fundamentals: Introduction, digital switching system, hierarchy and evolution of switching systems. Major digital switching systems (Lucent 5ESS switching system, Nortel's DMS 100, Ericsson's AXE 10, etc.,)

UNIT – II
Communications and control: Introduction, switching communication and control, functions of interface controller, network control processor, central processor, control architectures, switches fabric.

UNIT – III
Reliability modeling and analysis: Introduction, downtimes in DSS, reliability assessment techniques, failure models, state transition diagrams for central processor community, clock sub-system, network controller sub-system, switching network.

UNIT – IV
Switching System Software (SSS) and quality analysis: Basic software architecture, call models, call features, life cycle of SSS software development, methodology of accessing quality of SSS to CMM and ISO models.

UNIT – V
Analysis of DSS: Models for performance analysis of integrated packet networks, deterministic models, worst-case analysis, stochastic models. Models for traffic flow in packet networks. Current trends in DSS and

Text Books:

1. Digital Switching Systems, Syed R Ali, 4th reprint, 2003,Tata Mc Graw-Hill

Reference Books

1. Ross K W, "Multi Service Loss models for broad band telecommunication Networks", Springer-Verlag, 1995
2. Hui J Y, " Switching and traffic theory for integrated broad band networks", Kluwer Press, 1990