SCHEME OF INSTRUCTION

BE (INFORMATION TECHNOLOGY)

Proposed scheme with effect from the academic year 2017-2018

Semester - III

S.No	Course Code	Course	Scheme of Instruction			Scheme of Examination			Credit
			Hours Per Week			Contact	Maximum Marks		
			L	T	P	Hrs/Wk	CIE	SEE	
THEORY									
1	PC 301 IT	Discrete Mathematics	3	1	0	4	30	70	3
2	PC 302 IT	**Microelectronics**	3	1	0	4	30	70	3
3	PC 303 IT	Digital Electronics & Logic Design	3	1	0	4	30	70	3
4	PC 304 IT	**Data Structures**	3	1	0	4	30	70	3
5	PC 305 IT	**Probability and Random Processes**	3	1	0	4	30	70	3
6	MC 322 HS	Environmental Studies	3	0	0	3	30	70	3
PRACTICALS									
7	PC 331 IT	**Data Structures Lab**	0	0	4	2	25	50	2
8	PC 332 IT	**Basic Electronics Lab**	0	0	2	2	25	50	1
9	PW333 IT	Mini Project – I	0	0	4	2	25	50	1
TOTAL			18	5	6	29	255	570	22

P. Dean,
Faculty of Informatics,
Osmania University

PC 301 IT **DISCRETE MATHEMATICS**

Instruction:	(3L+1T)Hours/Wk
Duration of University Examination:	3 Hours
University Examination(SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objectives:

1. To Learn mathematical concepts as applied in computer science for solving logical problems.
2. To model relationships, analyze data, apply probability concepts and use functions to solve problems.
3. To develop the mathematical skills needed for advanced quantitative courses.

UNIT – I

Logic – Sets and Functions – Logic, Propositional equivalences – Predicates and quantifiers – Nested quantifiers-Sets-Set Operations, Functions.

Algorithms- Integers – Matrices : Algorithms, Complexity of Algorithms. The Integers and Division, Integers and Algorithms, Applications of Number Theory, Matrices.

UNIT – II

Mathematical Reasoning, Induction, and Recursion: Proof Strategy, Sequence and Summation, Mathematical Induction, Recursive Definitions and Structural Induction, Recursive Algorithms.

Counting – Basics, Pigeonhole principle, Permutations and combinations – Binomial Coefficients, Generalized Permutations and combinations, Generating permutations and combinations.

UNIT – III

Discrete Probability: An Introduction to Discrete Probability theory, Expected Value and Variance.

Advanced Counting Techniques: Recurrence relations – Solving Recurrence Relations, - Divide and conquer relations – and Recurrence Relations, Generating function – Inclusion – Exclusion – Applications of Inclusion – Exclusion.

UNIT – IV

Relations – Relations & their Properties, n-ray relations and applications, Representing relations – Closures, equivalence relations, partial orderings.

Graphs: Introduction, Graph terminology, representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamiltonian paths, Shortest path problems, Planar graphs, Graph coloring.

UNIT –V

Trees: Introduction to Trees, Application of Trees, Spanning Trees, Minimum Spanning Trees.

Boolean Algebra: Boolean function, Representing Boolean functions, Logic Gates

Suggested Reading:

1. Kenneth H. Rosen – Discrete Mathematics and its Application – 5th Edition, McGraw Hill, 2003.
2. J. K. Sharma, Discrete Mathematics, Second Edition, Macmillan, 2005.
3. J.P. Tremblay, R. Manohar, Discrete Mathematical Structure with Application to Computer Science, McGraw Hill – 1997.

4. Joel. Mott. Abraham Kandel, T.P. Baker, Discrete Mathematics for Computer Scientist & Mathematicians, Prentice Hail N.J., 2nd Edition, 1986.

PC 302 IT **MICRO ELECTRONICS**

Instruction:	(3L + 1T) Hours/Wk
Duration of University Examination:	3 Hours
University Examination(SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objectives:

1. To understand basic semiconductor devices and create foundation for forthcoming circuit design courses
2. To train students in logic design for real world problems.
3. To familiarize with the principles of the transducers and advances in Instrumentation

UNIT – I

Semi-conductors, Conductors, and Insulators, Conduction in semiconductors, N-type and P-type semi-conductors, PN junction diode. Forward and Reverse bias characteristics, Breakdown diodes.Rectifier Circuits, Limiting and clamping circuits, Schottky Barrier diode and Varactor diode. Cathode Ray Oscilloscope and its applications.

UNIT – II

Bipolar junction transistors – Physical structure and modes of operation, npn transistor, pnp transistor, CB,CE input and output characteristics, transistor as a switch ,transistor as an amplifier, biasing of a transistor. The Junction Field-Effect Transistors(JFET) – Structure and physical operation, Current – Voltage characteristics (Drain and Transfer).

MOSFET – Physical structure and modes (Enhancement & depletion) of operation.

UNIT – III

Feedback – Structure, Properties of negative feedback, Topologies, Advantages of negative feedback. Sinusoidal Oscillators – Loop gain, Barkhausen criteria, RC Oscillators, LC Oscillators and Crystal Oscillators.

UNIT – IV

Operational Amplifiers : Ideal characteristics, Op. Amp. as-Adder, Subtractor, Integrator, Differentiator and comparator. Generation of Square and Triangular waveforms using Op.Amp, Monostable multivibrator

Op. Amp. as - V to I and I to V converter, Instrumentation Amplifier, logarithmic and antilogarithmic amplifiers, analog multiplier.

UNIT – V

Digital CMOS logic circuits: Introduction, digital IC technologies and logic circuit families, Voltage Transfer Characteristic (VTC) of inverter, Noise Margins, Propagation delay, static operation of a CMOS inverter.

CMOS logic gate circuits: Basic structure (PUN and PDN), Implementation of 2-input NOR gate, NAND gate, complex gates and exclusive OR gate.

Suggested Reading :

1. Adel S. Sedra, Kenneth C. Smith, Micro Electronic Circuits, 5th Edition, Oxford International Student Edition, 2006.
2. S.Salivahan , Electronics Devices and Circuits, 4th Edition, McGraw Hill, 2009.
3. Jocob Millman, Arvin Grable – Micro Electronics – 2nd Edition, McGraw Hill 1987.

PC 303 IT DIGITAL ELECTRONICS AND LOGIC DESIGN

Instruction:	(3L+1T) Hrs/Wk
Duration of University Examination:	3 Hours
University Examination (SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objectives:

1. To learn the principles of digital hardware and support given by it to the software.
2. To explain the operation and design of combinational and arithmetic logic circuits.
3. To design hardware for real world problems.

UNIT – I

Design Concepts – Digital Hardware, Design process, Design of digital hardware Introduction to logic circuits – Variables and functions, Logic gates and networks. Boolean algebra, Synthesis using AND, OR, and NOT Gates, Design examples.

Optimized implementation of logic functions – Karnaugh Map, Strategies for minimization, minimizing Product-of-Sum Forms, Incompletely Specified functions, multiple output circuits. NAND and NOR logic networks, Introduction to CAD tools and Very High Speed Integrated Circuit Hardware Description Language (VHDL).

UNIT – II

Programmable logic devices: general structure of a Programmable Logic Array (PLA), gate level diagram, schematic diagram, Programmable Array Logic (PAL) Structure of CPLDs and FPGAs, 2-input and 3-input lookup tables (LUT). Design of Arithmetic circuits, VHDL for Arithmetic-circuits Combinational circuit building blocks – Multiplexers, Decoders, Encoders, Code converters, Arithmetic comparison circuits. VHDL for Combinational circuits.

UNIT – III

Basic Latch Gated SR Latch, Gated D Latch, Master-Slave and Edge- Triggered D Flip- Flops, T Flip-flop, JK Flip-flop, Excitation tables. Registers-Shift Register, Counters- Asynchronous and synchronous counters, Ring counter, Johnson counter, VHDL code for D Flip-flop and Up-counter

UNIT – IV

Synchronous Sequential Circuits – Basic design steps. Moore and Mealy state model, State minimization, Design of a Counter using the Sequential Circuit Approach. Algorithmic State Machine (ASM) charts

UNIT – V

Asynchronous Sequential Circuits – Behaviour, Analysis, Synthesis, State reduction, State Assignment, examples. Hazards: static and dynamic hazards. Significance of Hazards. Clock skew, set up and hold time of a flip-flop.

Suggested Reading:

1. Stephen Brown, Zvonko Vranesic, “Fundamentals of Digital Logic with VHDL Design”, 2nd Edition, McGraw Hill, 2009.

2. Jain R.P., "Modern Digital Electronics," 3rd Edition, TMH, 2003.
3. John F. Wakerly, "Digital Design Principles & Practices",3rd Edition, Prentice Hall, 2001
4. M. Morris Mano, Charles R. Kime, "Logic and Computer Design Fundamentals", 2nd Edition, Pearson Education Asia, 2001.
5. ZVI Kohavi, Switching and Finite Automata Theory, 2nd Edition, Tata McGraw Hill, 1995.
6. William I Fletcher, "An Engineering Approach to Digital Design", Eastern Economy Edition, PHI
7. H.T. Nagle, "Introduction to Computer Logic", Prentice Hall, 1975.

PC 304 IT DATA STRUCTURES

Instruction:	(3L+1T) Hrs/Wk
Duration of University Examination:	3 Hours
University Examination(SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objectives:

1. To develop proficiency in the specification, representation, and implementation of abstract data types and data structures.
2. To understand of applications of data structures.
3. To solve advanced computer science problems by making appropriate choice for intended applications.

UNIT-I

Algorithm Specification, Performance Analysis and Measurement.

Arrays: Abstract Data Types and the C++ Class, Array as an Abstract Data Type, Polynomial Abstract Data Type, Sparse Matrices, Representation of Arrays, String Abstract Data Type.

UNIT-II

Stacks and Queues: Templates in C++, Stack Abstract Data Type, Queue Abstract Data type, Sub typing and Inheritance in C++, A Mazing Problem, Evaluation of Expressions.

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UNIT-III

Linked Lists: Singly Linked Lists and Chains, Representing Chains in C++, Template Class Chain, Circular Lists, Available Space Lists, Linked Stacks and Queues, Polynomials, Doubly Linked Lists.

Hashing: Static Hashing, Hash Tables, Hash Functions, Overflow Handling, Theoretical Evaluation of Overflow Techniques

UNIT-IV

Trees: Introduction, Binary Trees, Binary Tree Traversal and Tree Iterators, Copying Binary Trees, Threaded Binary Trees, Heaps, Efficient Binary Search Trees: AVL Trees, m-way Search Trees, Introduction to Red Black tree & splay tree, B-tree.

Graphs: Graph Abstract Data Type, Elementary Graph operations (DFS and BFS), Minimum Cost Spanning Trees (Prim's and Kruskal's Algorithms).

UNIT-V

Sorting: Insertion sort, Quick sort, Best computing time for Sorting, Merge sort, Heap sort, shell sort, Sorting on Several Keys, List and Table Sorts, Summary of Internal Sorting.

Suggested Reading:

1. Ellis Horowitz, Dinesh Mehta, S. Sahani. Fundamentals of Data Structures in C++, Universities Press. 2007.
2. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, Pearson Education 2006.
3. Michael T. Goodrich, Roberto Tamassia, David Mount, Data Structures and Algorithms in C++, Wiley India Pvt. Ltd, 2004.

PC 305 IT **PROBABILITY AND RANDOM PROCESSES**

Instruction:	4 Periods per week
Duration of University Examination:	3 Hours
University Examination(SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objectives:

1. To induce the ability to describe a random experiment in terms of procedure, observation, and a Probability model.
2. To inculcate ability to characterize functions of random variables
3. To familiarize the students with the methods to characterize stochastic processes with an emphasis on stationary random processes.

UNIT – I

Probability: Introduction, definitions. The Axioms of Probability: Set theory, Probability Space Conditional Probability, Baye's Theorem. Repeated Trials: Combined Experiments, Bernoulli Trials Bernoulli's theorem and games of chance.

The Concept of a Random Variable: Introduction, Continuous and Discrete Random variables.

UNIT – II

Distribution and Density functions: Properties. Specific Random Variables: Normal, Exponential, Uniform, Gamma, Bernouli, Binomial, Poisson, Geometric and Negative Binomial Distributions. Conditional Distributions, Normal Approximation, Poisson approximation, Functions of One Random Variable: The Random Variable g(x) , Distribution and density of g(x), Mean and Variance. Moments. Characteristic Functions and their properties.

UNIT – III

Two Random Variables: Bivariate Distributions and their properties. One Function of Two Random variables and its density function. Two Functions of Two Random Variables and their Joint density. Joint Moments. Joint Characteristic Functions. Conditional Distribution and Density. Conditional Excepted Values.

UNIT – IV

Random Processes – Definitions. Classification, Stationarity- Wide Sense and Strict Sense stationary processes. Ergodicity – Mean and Correlation Ergodic process. Auto-correlation and Covariance functions with their properties.

UNIT –V

Spectral representation of Random Peocesses: Power Spectral density and its properties, Weiner – Kintchine theorem. Gaussian Process, Poisson Process. Noise: Types, Low pass and Band pass representation of white noise.

Suggested Reading:

1. Papoulis: Probability, Random Variables and Stochastic Processes, 4th Edition Tata McGraw Hill, 2002
2. T.Veerarajan, "Probability, Statistics and Random Process", 3rd Edition Tata McGraw Hill
3. Peyton Peebles: Probability, Random Variables and Random Signal Principles, Fourth Edition, Tata McGraw Hill,2009.
4. H.Stark and J Woods: Probability, Random Processes and Estimation Theory for Engineers, Prentice, 2010.
5. P.Ramesh Babu , "Probability Theory and Random Processes" – TMH Education Private Limited First Edition-2014

MC 322 HS **ENVIRONMENTAL STUDIES**

Instruction:	3L Hrs/Wk
Duration of University Examination:	3 Hours
University Examination(SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objectives:

1. To study the basic concepts, sources of water, floods and their impact on environment
2. To know the ecosystems and energy resources systems
3. To understand the Biodiversity concepts and their advantages
4. To study the different pollutions and their impact on environment
5. To know the social and environment related issues and their preventive measures

UNIT– I

Environmental Studies: Definition, scope and importance, need for public awareness.
Natural resources: Water resources; use and over-utilization of surface and ground water, floods, drought, conflicts over water
Dams: benefits and problems. Effects of modern agriculture, fertilizer- pesticide problems, water logging and salinity.

UNIT-II

Ecosystems: Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in ecosystem, food chains, ecological pyramids, aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries).
Energy resources: Growing energy needs, renewable and non-renewable energy sources. Land Resources, land as a resource, land degradation, soil erosion and desertification.

UNIT-III

Biodiversity: Genetic species and ecosystem diversity, bio-geographical classification of India. Value of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT-IV

Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution; solid and liquid waste management.
Environment Protection Act: Air, water, forest and wild life Acts, enforcement of environmental legislation.

UNIT-V

Social Issues and the Environment: Water conservation, watershed management, and environmental ethics. Climate change, global warming, acid rain, ozone layer depletion.
Environmental Disaster Management: Types of disasters, impact of disasters on environment, infrastructure, and development. Basic principles of disaster mitigation, disaster management, and methodology. Disaster management cycle, and disaster management in India.

Suggested Reading:

1. A.K. De “Environmental Chemistry”, Wiley Eastern Ltd.
2. E.P. Odum “Fundamentals of Ecology”, W.B. Sunders Co., USA.
3. M.N. Rao and A.K. Datta “Waste Water Treatment”, Oxford and IBK Publications.
4. Benny Joseph “Environmental Studies”, Tata McGraw Hill, 2005.
5. V.K. Sharma “Disaster Management”, National Centre for Disaster Management, IIPE, Delhi,1999.
6. Teri Document, “Green Building Council of India”

PC 331 IT **DATA STRUCTURES LAB**

Instruction:	4 P Hrs/Wk
Duration of University Examination:	3 Hours
University Examination(SEE):	50 Marks
Sessionals(CIE):	25 Marks

Course Objectives:

1. To design, analyze, and implement basic data structures and algorithms.
2. To implement data structures such as Trees, Threaded Binary Trees, Heaps, graph operations and algorithms.
3. To familiarize with advanced tree structures like AVL, Splay, m-way, B-Trees.

List of Experiments:

1. Write a C++ program for the implementation of Array ADT
2. Write a C++ program for the implementation of String ADT
3. Write a C++ program to implement the following using array
   a) Stack ADT b)Queue ADT
4. Write a C++ program to implement the following using a single linked list
   b) Stack ADT b)Queue ADT
5. Write a C++ program for evaluation of Infix to postfix conversion, evaluation of postfix expression.
6. Write a C++ program to implement polynomial arithmetic using linked list.
7. Write a C++ program to perform following operations:
   a) Insert an element into a binary search tree
   b) Delete an element from a binary search tree
   c) Search for a key element in a binary search tree
8. Write a C++ program to implement all the functions of a dictionary(ADT) using hashing
9. Write C++ program for the implementation of tree traversals on Binary Trees
10. Write C++ program to perform following operations
    a)Insertion into B- tree
    b)Deletion into B- tree
11. Write C++ program to perform following operations
    a)Insertion into AVL tree
    b)Deletion into AVL tree
12. Write C++ program for the implementation of bfs and dfs for a given Graph
13. Write C++ program for the implementation of Splay Trees
14. Write C++ program to implement Kruskal's algorithm to generate a minimum spanning tree.
15. Write C++ program to implement Prim's algorithm to generate a minimum spanning tree
16. Write C++ program for implementing the following sorting methods
    a) Selection sort b) Quick sort c) shell sort d) Merge sort e) Heap sort

PC 332 IT **BASIC ELECTRONICS LAB**

Instruction:	2 P Hrs/Wk
Duration of University Examination:	3 Hours
University Examination (SEE):	50 Marks
Sessionals (CIE):	25 Marks

Course Objectives:

1. To study the electronics components.
2. To study characteristics of semi-conductor devices and design rectifiers, filters and amplifiers.
3. To study simple electronic circuits

List of Experiments

ANALOG:

1. CRO and its applications: Measurement of amplitude, frequency. Obtaining transfer characteristics and lissajous figures.
2. Characteristics of pn junction diode , zener diode, BJT and FET.
3. Diode applications-Half-wave and full-wave rectifiers, clipping and clamping circuits.
4. Hartley and RC phase shift oscillators.
5. Inverting and non-inverting Operational Amplifier.
6. Operational Amplifier as an adder, sub tractor, differentiator, integrator.

DIGITAL:

6. Truth table verification of logic gates using TTL 74 series ICs.
7. Half Adder, Full Adder, Decoder, MUX
8. Truth table verification of D flip flop, SR flip-flop ,T flip-flop and JK flip-flop
9. Counters.
10. Shift Registers

SOFTWARE: Any 3 experiments using PSPICE.

Note : All the experiments are compulsory.

PC 333 IT **MINI PROJECT – I**

Instruction:	2 Hrs/Wk
Duration of University Examination:	3 Hours
University Examination(SEE):	50 Marks
Sessionals(CIE):	25 Marks

Course Objectives:

1. To develop capability to analyse and solve real world problems with an emphasis on applying/integrating knowledge acquired.
2. To take responsibility of the end product.

The Students are required to take one of larger projects listed in the suggested readings or assigned by the teacher, implement and submit the report. The workbooks and project reports should be evaluated.