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.

.

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.

With effect from the academic year 2017-2018

SCHEME OF INSTRUCTION

BE (INFORMATION TECHNOLOGY)

Proposed scheme with effect from the academic year 2017-2018

Semester – IV

S.No	Course Code	Course	Scheme of Instruction			Scheme of Examination			Credits
			Periods Per week			Contact	Maximum Marks		
			L	T	P	Hrs/Wk	CIE	SEE	
THEORY									
1	PC 401 EC	Signals and Systems	3	1	0	4	30	70	3
2	PC 402 IT	Computer Organisation & Microprocessor	3	1	0	4	30	70	3
3	PC 403 IT	**Scripting Languages**	3	1	0	4	30	70	3
4	PC 404 IT	OOPS USING JAVA	3	1	0	4	30	70	3
5	PC 405 IT	Data Communications	3	1	0	4	30	70	3
6	MC411BM	**Managerial Economics and Accountancy**	3	0	0	3	30	70	3
PRACTICALS									
7	PC 431 IT	Microprocessor Lab	0	0	2	2	25	50	1
8	PC 432 IT	**JAVA Lab**	0	0	4	2	25	50	2
9	PW 433 IT	Mini Project - II	0	0	4	2	25	50	2
TOTAL			18	5	6	29	255	570	23

Dean,
Faculty of Informatics.
Osmania University

PC 401 IT **SIGNALS AND SYSTEMS**

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

Course Objectives:

1. To explain signals and systems representations/classifications and also describe the time and frequency domain analysis of continuous time signals with Fourier series, Fourier transforms and Laplace transforms.
2. To understand Sampling theorem, with time and frequency domain analysis of discrete time signals with DTFS, DTFT and Z-Transform.
3. To present the concepts of convolution and correlation integrals and also understand the properties in the context of signals/systems and lay down the foundation for advanced courses.

UNIT-I

Some useful operations on signals: Time shifting, Time scaling, Time inversion.
Signal models: Impulse function, Unit step function, Exponential function, Even and odd signals.
Systems: Linear and Non-linear systems, Constant parameter and time varying parameter systems, Static and dynamic systems, Causal and Non-causal systems, Lumped Parameter and distributed parameter systems, Continuous-time and discrete-time systems, Analog and digital systems.

UNIT-II

Fourier Series:
Signals and Vectors, Signal Comparison: correlation, Signal representation by orthogonal signal set, Trigonometric Fourier Series, Exponential Fourier Series, LTI system response to periodic inputs.

UNIT-III

Continuous-Time Signal Analysis:
Fourier Transform: Aperiodic signal representation by Fourier integral, Fourier Transform of some useful functions, Properties of Fourier Transform, Signal transmission through LTI Systems, ideal and practical filters, Signal energy.
Laplace transform: Definition, some properties of Laplace transform, solution of differential equations using laplace transform.

UNIT-IV

Discrete-time signals and systems: Introduction, some useful discrete-time signal models, Sampling continuous-time sinusoids and aliasing, Useful signal operations, examples of discrete-time systems.
Fourier Analysis of discrete-time signals, periodic signal representation of discrete-time Fourier Series, aperiodic signal representation by Fourier integral.

UNIT-V

Discrete-time signal analysis:

Z-Transform, some properties of Z-Transform, Solution to Linear difference equations using Z-transform, System realization. Relation between Laplace transform and Ztransform.

DTFT: Definition, Properties of DTFT, comparison of continuous-time signal analysis with discrete-time signal analysis.

Suggested Reading:

1. B. P. Lathi, Linear Systems and Signals, Oxford University Press, 2nd Edition, 2009
2. Alan V O P Penheim, A. S. Wlisky , Signals and Systems, 2nd Edition, Prentice Hall
3. Rodger E. Ziemer, William H Trenter, D. Ronald Fannin, Signals and Systems, 4th Edition, Pearson 1998.
4. Douglas K. Linder, Introduction to Signals and Systems, McGraw Hill, 1999
5. P. Ramakrishna Rao, Signals and Systems, TMH.

PC 402 IT COMPUTER ORGANISATION AND MICROPROCESSOR

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

Course Objectives:

1. To provide in depth knowledge to the students about the design and organization of a digital computer, operation of various functional units, instruction set design and factors that influence the performance of a computer.
2. To enable the students with the understanding of basic computer architecture with instruction set and programming of 8085 in particular.
3. To learn the functionality and interfacing of various peripheral devices.

UNIT-I

Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Software, Performance, Multiprocessors and Multicomputers, Historical perspective. Input/Output Organization: Accessing I/O devices, Interrupts, Processor examples, Direct memory access, Buses, Interface circuits, Standard I/O interfaces.

UNIT-II

The Memory System: Basic concepts, Semi conductor RAM memories, Read-Only memories, Speed, Size and Cost, Cache memories, Performance considerations, Virtual Memories, Memory management requirements, Secondary Storage.

UNIT-III

8085 Architecture: Introduction to microprocessors and microcontrollers, 8085 Processor Architecture, Internal operations, Instructions and timings. Programming the 8085 - Introduction to 8085 instructions, Addressing modes and Programming techniques with Additional instructions.

UNIT-IV

Stacks and subroutines, interfacing peripherals - Basic interfacing concepts, Interfacing output displays, Interfacing input keyboards. Interrupts - 8085 Interrupts, Programmable Interrupt Controller (8259A). Direct Memory Access (DMA) - DMA Controller (Intel 8257), Interfacing 8085 with Digital to Analog and Analog to Digital converters.

UNIT-V

Programmable peripheral interface (Intel 8255A), Programmable communication interface (Intel 8251), Programmable. Interval timer (Intel 8253 and 8254), Programmable Keyboard /Display controller (Intel 8279). Serial and parallel bus standards RS 232 C, IEEE 488.

Suggested Reading:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, 5th Edition, McGraw Hill, 2002.
2. Ramesh S Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085, 5/E Prentice Hall, 2002.
3. Pal Chouduri, Computer Organization and Design, Prentice Hall of India, 1994.
4. M. M. Mano, Computer System Architecture, 3rd Edition, Prentice Hall, 1994.

PC 403 IT **SCRIPTING LANGUAGES**

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

Course Objectives:

1. To understand why Python is a useful scripting language for developers.
2. To learn how to design and program Python applications.
3. To learn how to use lists, tuples, and dictionaries in Python programs.
4. To learn how to write loops and decision statements in Python.
5. To learn how to write functions and pass arguments in Python.
6. To learn how to read and write files in Python.

Unit- I

INTRODUCTION: Origin of Scripting , Scripting Today, Definition of scripting language, Characteristics of Scripting Languages, Uses for Scripting Languages, How scripting languages differ from non-scripting languages; Types of scripting languages.

Unit- II

Introduction to Python: Python - History Language Features, Installing Python, Environment Setup, Running a Python Script, Python Versions: 2.x vs. 3.x,

Data Types, Operators, Expressions- Comments Indentation, Built-in Data Types, Variables, Operators, Expressions.

Unit-III

Control Statements: if Statements for Statement, while Statement, Use of range () in for loop, Use of break, continue, else in Loops, Use of pass Statement

Standard I/O Operations Input from Standard Input Device, Output to Standard Output Device Formatting String with %, Formatting string with format()

Unit-IV

Sequences, Strings: Lists, Tuples, Sets, Dictionaries, Strings and String Operations.

Functions: Function Definitions, Function Calling, DocStrings, Local Variables and Global Variables, Built-in Functions

Unit-V

File Handling: Opening modes, with statement, Closing a file, File read positions in Python, Renaming and deleting files in Python, The rename() method, The remove() method, Python file object methods.

Suggested Reading:

1. Martin C Brown, "Python: The Complete Reference", McGrawHill Education,2001.
2. Mark Chen, **"**Python: The Ultimate Beginner's Guide for Becoming Fluent in Python Programming", CreateSpace Independent Publishing Platform, October 2016.

PC 404 IT **OOPS USING JAVA**

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

Course Objectives:

1. To understand fundamentals of object-oriented programming in Java which includes defining classes, invoking methods, using class libraries.
2. To create Java application programs using sound OOP practices such as interfaces, APIs and error exception handling.
3. Using API to solve real world problems.

UNIT- I

Object Oriented System Development: Understanding Object Oriented Development, Understanding Object Concepts, Benefits of Object Oriented Development.

Java Programming Fundamentals: History of Java, Java buzzwords, data types, variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT- II

Inheritance: Inheritance concept, benefits of inheritance, Super classes and Sub classes, Member access rules, Inheritance hierarchies, super uses, preventing inheritance: final classes and methods. Polymorphism - dynamic binding, method overriding, abstract classes and methods, the Object class and its methods.

Interfaces: Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface.

Packages: Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages

UNIT- III

Exception handling: Dealing with errors, benefits of exception handling, the classification of exceptions - exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exception sub classes

Multithreading: Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, interthread communication, thread groups, daemon threads

UNIT- IV

Collections: Overview of Java Collection frame work, Commonly used Collection classes – ArrayList, LinkedList, HashSet, HashMap, TreeMap, Collection Interfaces – Collection, Set, List, Map, Legacy Collection classes – Vector, Hashtable, Stack, Dictionary(abstract), Enumeration interface, Iteration over Collections – Iterator interface, ListIterator interface.

Other Utility classes: String Tokenizer, java.util. Files – streams - byte streams, character streams, text Input/output, binary input/output, random access file operations, File management using File class, java.io. , serialization

UNIT- V

GUI Programming with java: The AWT class hierarchy, Introduction to Swing, Swing vs. AWT, MVC architecture, AWT Classes.

AWT Controls: Components, container, panel, window, frames, canvas, Font class, Color class and Graphics, Layout Managers, Menu bars and Menus, Dialog Boxes, FileDialog.

Event Handling: Handling mouse and keyboard events, Delegation Event Model, Event Classes, Source of Events, Event Listener Interfaces. Examples: handling a button click, handling mouse and keyboard events, Adapter classes.

Applets – Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet, Developing applets and testing, passing parameters to applets, applet security issues.

Suggested Reading:

1. Herbert Scheldt, "The Complete Reference Java, 7th Edition, Tata McGraw Hill, 2006.
2. James M Slack, Programming and Problem Solving with JAVA, Thomson Learning, 2002.
3. C Thomas Wu, An Introduction to Object Oriented Programming with Java 5th Edition, McGraw Hill Publishing, 2010.
4. H. M. Dietel and P. J. Dietel, Java How to Program, Sixth Edition, Pearson Education / PHI.

PC 405 IT **DATA COMMUNICATIONS**

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

Course Objectives:

1. To understand the basics of data transmission, transmission media, data communications system and its components.
2. To describe various encoding and modulation schemes, various data link protocols for flow control, error detection and correction.
3. To understand different types of multiplexing, spread spectrum techniques, Ethernet, services of WLANs and Bluetooth.

UNIT-I

Introduction: Communication model and Modulation Techniques (AM, FM and PM), Data Communication networking, Protocols and Architecture, Standards.

Data Transmission: Concepts and Terminology, Analog and Digital Transmission, Transmission Impairments, Transmission media.

Data Encoding: Digital Data Digital Signals, Digital Data-Analog Signals, Analog Data- Digital Signals, Analog Data-Analog Signals.

UNIT-II

Data Communication Interface: Asynchronous and Synchronous Transmission, Line Configuration, Interfacing.

Data Link Control: Flow Control, Error Detection, Error Control, HDLC, Other Data link Control Protocols, Performance Issues**.**

UNIT - III

Multiplexing & Switching: Frequency Division Multiplexing, Wavelength Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing. Asymmetric Digital Subscriber Line, xDSL. Circuit Switching, Packet Switching & Frame Relay. ATM : Architecture, Logical Connection, ATM Cells, Transmission of ATM cells.

UNIT -IV

Ethernets: Traditional Ethernet Topologies and Transmission Media, LAN protocol architecture, MAC sub layer, CSMA/CD, Physical Layer, Bridged, Switched and Full Duplex Ethernets. Fast Ethernet: MAC sub Layer, Physical layer, Gigabit Ethernet: MAC sub Layer, Physical Layer

UNIT –V

Cellular Wireless Networks: Principles of Cellular Networks, First Generation Analog, Second Generation CDMA and Third Generation Systems.

Wireless LANs: Overview, Wireless LAN Technology, IEEE 802.11 Architecture and Services, IEEE 802.11 Medium Access Control, IEEE 802.11 Physical Layer.

Bluetooth & Zigbee: Architecture, Layers and Protocols.

Suggested Reading:

1. William Stallings, "Data and Computer Communication", 8th Edition, Pearson Education, Asia-2004.
2. Behrouz A. Forouzan, "Data Communications and Networking", 4th Edition, Tata McGraw Hill, 2006.
3. Simon Haykins "Communication Systems", 2nd Edition, John Wiley & Sons
4. Drew Gislason "Zigbee Wireless Networking" Elsevier Published: August 2008

MC 411 BM MANAGERIAL ECONOMICS AND ACCOUNTANCY

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

Course Objective:

1. To provide the analytical tools and managerial insights that are essential for the solution of those business problems that have significant consequences for the firm and society.

Unit I

Meaning and Nature of Managerial Economics: Managerial Economics its usefulness to Engineers, Fundamental Concepts of Managerial Economics, Scarcity, Marginalism, Equi-marginalism, Opportunity costs, Discounting, Time Perspective, Risk and Uncertainty, Profits, Case study method.

Unit II

Consumer Behaviour: Law of Demand, Determinants, Kinds; Elasticity of Demand (Price, Income and Cross-Elasticity); Demand Forecasting, Law of Supply, Concept of Equilibrium. (Theory questions and small numerical problems can be asked).

Unit III

Theory of Production and Markets: Production Function, Law of Variable Proportion, ISO quants, Economics of Scale, Cost of Production (Types and their measurement), Concept of Opportunity Cost, Concept of Revenue, Cost-Output relationship, Break-Even Analysis, Price – Output determination under Perfect Competition and Monopoly (theory and problems can be asked).

Unit IV

Capital Management: Its significance, determination and estimation of fixed and working capital requirements, sources of capital, Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems. (Theory questions are numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked).

Unit V

Book-keeping: Principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts Trial Balance, concept and preparation of Final Accounts with simple adjustments, Analysis and interpretation of Financial Statements through Ratios.

(Theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement, calculation of some ratios).

Suggested Reading:

1. Mehta P.L., "*Managerial Economics – Analysis, Problems and Cases"*, Sulthan Chand & Son's Educational publishers, 2011.
2. Maheswari S.N. "*Introduction to Accountancy",* Vikas Publishing House, 2005.
3. Panday I.M. "*Financial Management",* Vikas Publishing House, 2009.

PC 431 IT **MICROPROCESSOR LAB**

Instruction:	4 Periods per week
Duration of University Examination:	3 Hours
University Examination(SEE):	50 Marks
Sessionals(CIE):	25 Marks

Course Objectives:

1. To become familiar with the architecture and Instruction set of Intel 8085 microprocessor.
2. To provide practical hands on experience with Assembly Language Programming.
3. To familiarize the students with interfacing of various peripheral devices with 8085 microprocessor.

List of Experiments

1. Tutorials on 8085 Programming.
2. Interfacing and programming of 8255. (E.g. traffic light controller).
3. Interfacing and programming of 8254.
4. Interfacing and programming of 8279.
5. A/D and D/A converter interface.
6. Stepper motor interface.
7. Display interface.

Note: Adequate number of programs covering all the instructions of 8085 instruction set should be done on the 8085 microprocessor trainer kit

PC 432 IT **JAVA LAB**

Instruction:	4 Periods per week
Duration of University Examination:	3 Hours
University Examination(SEE):	50 Marks
Sessionals(CIE):	25 Marks

Course Objectives:

1. To build software development skills using java programming for real world applications.
2. To implement frontend and backend of an application
3. To implement classical problems using java programming.

List of Experiments

1) Write a Java program to illustrate the concept of class with method overloading
2) Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use String Tokenizer class of java. util)
3) Write a Java program to illustrate the concept of Single level and Multi level Inheritance.
4) Write a Java program to demonstrate the Interfaces & Abstract Classes.
5) Write a Java program to implement the concept of exception handling.
6) Write a Java program to illustrate the concept of threading using Thread Class and runnable Interface.
7) Write a Java program to illustrate the concept of Thread synchronization.
8) Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
9) Write a Java program to illustrate collection classes like Array List, LinkedList, Tree map and Hash map.
10) Write a Java program to illustrate Legacy classes like Vector, Hashtable, Dictionary & Enumeration interface
11) Write a Java program to implement iteration over Collection using Iterator interface and ListIterator interface
12) Write a Java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
13) Write a Java program to illustrate the concept of I/O Streams
14) Write a Java program to implement serialization concept
15) Write a Java applet program to implement Color and Graphics class
16) Write a Java applet program to implement AWT classes like Label, TextField, Checkbox, CheckboxGroup, Button, TextAreaetc
17) Write a Java applet program for handling mouse & key events
18) Write a Java applet program to implement Adapter classes
19) Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result.

PW 433 IT **MINI PROJECT - II**

Instruction:	4 Periods per week
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 the projects listed in the suggested readings or assigned by the teacher, implement and submit the report. The project reports should be evaluated.