

Syllabus Structure

Second Year – Department of Information Technology

SEMESTER – III

Course Code	Course Title	Lectures (L)	Tutorials (T)	Practical (P)	Credits	
					Th	Pr
UIT201	Digital Systems Design (CS)	03	--	02	03	01
UIT203	Data Structures (CS)	03	01	02	04	01
UIT205	Object Oriented Programming (CS)	03	--	02	03	01
UIT207	Discrete Mathematics (ES)	03	01	--	04	--
UIT209	Electronic Devices and Circuits (CS)	03	--	02	03	01
UIT211	Computer Laboratory-I (CS)	--	--	02	--	02
UHS221	Human Values and Professional Ethics (MC)	02	--	--	02	--
	Total	17	02	10	19	06

SEMESTER -IV

Course Code	Course Title	Lectures (L)	Tutorials (T)	Practical (P)	Credits	
					Th	Pr
UMA202	Differential Equations (BS)	04	--	--	04	--
UIT204	Computer Organization (CS)	03	01	--	04	--
UIT206	Microprocessors and Interfacing (CS)	03	--	02	03	01
UIT208	Java Programming (CS)	03	--	02	03	01
UIT210	Computer Laboratory-II (CS)	02	--	02	--	02
UIT212	Elective – I (Humanities / Basic Sciences) (HS)	03	--	--	03	--
UHS222	Professional Communication (HS)	02	--	02	02	01
	Total	19	01	10	19	05

Elective – I

UIT212 A: Elements of Indian History for Engineers

UIT212 B: Law for Engineers

UIT212 C: Economics for Engineers

UIT212 D: Indian Constitution

UIT212 E: Cyber Law

SEMESTER – III

Course Code	Course Title	Lectures (L)	Tutorials (T)	Practical (P)	Credits	
					Th	Pr
UIT201	Digital Systems Design (CS)	03	--	02	03	01
UIT203	Data Structures (CS)	03	01	02	04	01
UIT205	Object Oriented Programming (CS)	03	--	02	03	01
UIT207	Discrete Mathematics (ES)	03	01	--	04	--
UIT209	Electronic Devices and Circuits (CS)	03	--	02	03	01
UIT211	Computer Laboratory-I (CS)	--	--	02	--	02
UHS221	Human Values and Professional Ethics (MC)	02	--	--	02	--
	Total	17	02	10	19	06

UIT-201: DIGITAL SYSTEM DESIGN

(Total Credits:4, Lectures/Week:3, Practical/Week:2)

Objectives: This course provides introduction to logic design and the basic building blocks used in digital systems, in particular digital computers. It starts with a discussion of combinational logic: logic gates, minimization techniques, arithmetic circuits, and modern logic devices such as programmable logic gates. The second part of the course deals with sequential circuits: flip-flops, counters, registers, etc. State machines will then be discussed and illustrated through case studies. In VHDL, the students will learn how a Hardware Description Language (HDL) is used to describe and implement hardware. The emphasis is not on the details and syntax of the language, but rather how the language infers hardware. They will see how to simulate and test that hardware and optimise their designs.

- 1. Number Systems and Codes:** Binary, Octal, Decimal and Hexadecimal number Systems and their conversion, Binary Addition and Subtraction, Gray Code, BCD Code, Excess-3 code, ASCII Code.
- 2. Combinational logic design:** Switching algebra, Logic families, Combinational circuit analysis, Combinational circuit minimization, K-Map of three, four, five variable functions, Minimizing SOP and POS expressions, Quine Mc-Clusky minimization, timing hazards, circuit timing, Combinational PLDs, PLA, PAL devices, Encoders, Decoders, Tri-State devices, Multiplexes, Comparators, Arithmetic circuits- Half and full adders, Ripple adders, Subtractors, Carry look ahead adders, Design of combinational logic circuits using multiplexers and decoders.
- 3. Sequential logic design:** Latches and flip flops, Edge triggered and Master-Slave flip flops (SR, JK, D, T etc.), Clocked synchronous state machine analysis and design, Designing state machines using state diagrams, Counters and shift registers, synchronous design methodology, clock skew, gating the clock, asynchronous inputs.
- 4. Designing using VHDL:** Introduction to VHDL, Modelling styles, Data flow, behavioural, structural and mixed, VHDL description of combinational networks, modelling flip flops using VHDL, VHDL models for multiplexer, compilation and simulation of VHDL code, modelling a sequential machine, variables, signals and constants, arrays, VHDL operators, VHDL functions, VHDL procedures, attributes, multilevel logic.

- 5. Counters and shift Registers:** Asynchronous counters, Synchronous counters, MOD counters, Shift- counters, Up-down counters, Ripple counters, Shift Registers: Serial in Serial out, Serial in parallel out, Parallel in Serial out and Parallel in Parallel out.
- 6. Memories:** Random access memory, TTL RAM cell, read write cycles, MOS-static RAM cell, dynamic RAM cell, refreshing ROMs EPROM.

Term Work:

Term work shall consist of performing minimum 10 to 12 Experiments based on above syllabus or as directed by the concerned staff (using Hardware and VHDL). Practical Examination shall be of three hours duration and consists of one program and the oral based on the syllabus and term work.

Text/ Reference Books:

1. J. F. Wakerly, "Digital design- Principles and practices", PH International Pearson India, Third edition
2. J. Bhasker, "VHDL primer", Pearson Education Asia, third edition
3. W. I. Fletcher, "An Engineering approach to digital design", PHI
4. Samuel C. Lee, "Digital circuits and logic design", PHI
5. C. H. Roth Jr., "Digital systems design using VHDL", PWS publishing company
6. Kevin Skahill, "VHDL for programmable logic", Addison Wesley

UIT-203:DATA STRUCTURES

(Total Credits:4, Lectures/Week:3, Practical/Week:2)

Objectives: This course provides introduction the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing efficient algorithms. To develop effective software engineering practice, emphasizing such principles as decomposition, procedural abstraction, and software reuse.

- 1. Introduction to Data Structures:** Concepts of data and algorithms, Data object, Data type, Storage of data in memory, Arrays and Representation of Arrays.
- 2. Stack and Queues:** Stack Definition and concepts, operation on stack, Stacks and Expression Evaluation, Stacks and Recursion, Definition of Queue operations, Stack and Queue implementation, Simulation.
- 3. Linked Lists:** Linked Linear Lists, Operations on linear Lists using singly linked storage Structures, Circularly Linked lists, Doubly Linked linear lists, applications of linear lists, Polynomial manipulation, multi-precision arithmetic, linked stacks and Queues, Sparse matrices.
- 4. Trees:** Definition and concepts, operation on Binary trees, Storage representation and manipulation of Binary trees, Linked storage Representation of Binary tree, conversion of general trees to binary trees, sequential and other representation of trees, applications of trees, Manipulation of Arithmetic expressions, set representations, decision tree and game tree.
- 5. Graphs:** Graph definition and concepts, graph representation, Matrix representation of graph, List structures and other representation of graph, Breadth first search and depth first search, Spanning trees and applications of graph.

- 6. Searching and Sorting:** Linear search, Binary search, Tree searching, Hashing. Bubble sort, Quick sort, Insertion sort, Selection and Tree sorting.
- 7. File Organization:** Queries, index techniques, File organization, Sequential organization, Random organization, Linked organization, Inverted files.

Term Work:

The term work shall consist of minimum 10 to 15 programs based on above syllabus. Practical Examination shall be of three hours duration and consists of one program and the oral based on the syllabus and term work.

Text/Reference Books:

1. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publications
2. Tenenbaum, Langsam & Angenstein, "Data Structures using C", PHI
3. Tremblay and Sorenson, "An Introduction to Data Structures with Application", McGraw Hill.

UIT-205:OBJECT ORIENTED PROGRAMMING
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(Total Credits:4, Lectures/Week:3, Practical/Week:2)

Objectives: This course provides introduction to the basic programming constructs of C++. Manipulate various C++ data types, such as arrays, strings, and pointers. Use memory appropriately, including proper allocation / de-allocation procedures. Apply object-oriented approaches to software problems in C++ and advanced program flow techniques. Students learn how to write programs in an object-oriented high-level programming language. Topics covered include fundamentals of algorithms, flowcharts, problem solving, programming concepts, classes and methods, control structures, arrays, and strings.

- 1. Introduction to OOPS:** Differences with Procedural Languages, Tour of C++: Types and declarations, Expressions and statements. Decision making and loops Pointers, arrays and structures. Functions.
- 2. Object Oriented Concepts:** Data abstraction, Classes and objects, References, Inheritance, Polymorphism, Function and operator overloading, Virtual functions, Templates, Exception handling, file handling, Name spaces

Term Work:

Term work shall consist of performing minimum Fifteen experiments based on above syllabus. Students also need to develop a mini project in C++ Programming language. Practical Examination shall be of three hours duration and consists of one program and the oral based on the syllabus and term work.

Text/Reference Books:

1. B. Stroustrup, "C++ Programming Language", Addison Wesley
2. Balguruswamy, "Programming in C++", Tata Mc-Graw Hill
3. Venugopal, "Programming in C++", Tata Mc-Graw Hill

UIT-207:DISCRETE MATHEMATICS

(Total Credits:3, Lectures/Week:3, Practical/Week:0)

Objectives: This course provides introduction to develop logical thinking and its application to computer science. To emphasize the importance of proving statements correctly and de-emphasize the hand-waving approach. To enhance the ability to reason and ability to present a

coherent and mathematically accurate argument. To learn discrete structures towards simulation of a problem in computer science and engineering

- 1. The Foundations:** Logic, Sets and Functions. Logic, Propositions and Propositional equivalences, Predicates and Quantifiers, Sets and Set operations, Functions, Sequences and Summations, Growth of functions.
- 2. Number Theory:** The integers and division, Division algorithm, Greatest Common Divisions and Least Common Multiples, Modular arithmetic, Applications of Congruence, Cryptology, Euclidean algorithm, Representations of integers, Applications of numbers Theory, Linear congruence, Chinese remainder theorem, Computer arithmetic with large integers, Pseudo primes, Public Key Cryptography, RSA encryption and RSA decryptions.
- 3. Mathematical Reasoning:** Mathematical induction, Recursively defined Functions Recursively defined sets, Recursive algorithms, Methods of proof, Methods of proving theorems, Theorems and Quantifiers.
- 4. Counting:** The basics of counting, the Pigeonhole principle, Permutations and Combinations, Discrete Probability, Probability theory, Generalized Permutations and Combinations, Generating Permutations and Combinations.
- 5. Advanced Counting Techniques:** Recurrence Relations, Solving Recurrence Relations, Divide and Conquer Relations, Inclusion- Exclusion, and Applications of inclusion and Exclusion.
- 6. Relations:** Relations and their properties, n-ary relations and their applications, Representing relations, Closures of Relations, Equivalence relations and Partial orderings.
- 7. Graph Theory:** Basic concepts of Graph theory, Diagraphs: basic definition, path and circuits, Reachability and Connectedness, Matrix representation of graphs, Sub graphs and Quotient graphs, Isomorphic diagraphs and Transitive closure diagraph, Euler's path and circuits (only definition and examples), Trees: binary, labelled, undirected and spanning trees of connected relations, Prim's algorithm to construct spanning trees, Weighted graphs, Minimal spanning trees by Prim's and Kruskal's algorithm.

Text/Reference Books:

1. Kenneth H. Rosen, "Discrete Mathematics and its applications", 3rd Ed., McGraw Hill.
2. C.L. Liu, "Elements of Discrete Mathematics", McGraw Hill.
3. John Truss, "Discrete Mathematics for computer Scientists", Addison Wesley.

UIT-209: ELECTRONIC DEVICES AND CIRCUITS

(Total Credits:4, Lectures/Week:3, Practical/Week:2)

Objectives: The aim of including this course in the syllabus is to make students aware of the electronic devices which form the basis of all designs. They are not expected to learn the mathematics behind the subject, but are required to understand the basics. This course will provide introduction to electronic devices like diodes, BJTs, FETs etc. and their applications. It will start with diodes and their applications like rectifiers, clippers etc. The next topic covered will be Transistors: BJT and FET with their basic applications like amplifiers, switches etc., followed by the most useful device: OP-AMP. The course will end with A to D and D to A converters.

- 1. Diodes:** PN junction diode, Zener diode, Light emitting diode (LED), Photo diode, Varactor

diode, Schottky diode and Power diode with their V-I characteristics.

2. **Applications of diodes:** Rectifiers, regulators, Clippers, Clampers and diode as a switch.
3. **Transistors:** BJT, FET, MOSFET, SCR and UJT with their V-I characteristics.
4. **Applications of Transistors:** BJT and FET Amplifiers (in this basics of biasing are expected to be taught) with frequency response, oscillators with Barkhausen's criteria, Multivibrators (without mathematical analysis), transistor as a switch.
5. **Operational Amplifier:** Block diagram of OP-AMP, ideal characteristics of OP-AMP, applications of OP-AMP like Inverting amplifier, non-inverting amplifier, adder, subtractor, comparator, Integrator, Differentiator, Instrumentation amplifier, A to D and D to A converters, 555 timer block diagram and applications.

Term Work:

Term work shall consist of performing minimum 10 to 12 Experiments based on above syllabus or as directed by the course coordinator (using Hardware and Software - MultiSim). Practical Examination shall be of three hours duration and consists of one program and the oral based on the syllabus and term work.

Text/Reference Books:

1. L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit theory", 8th / 10th Edition, Prentice Hall Publications
2. V. K. Mehta, "Principles of Electronics", S. Chand Publications
3. Salivahanan, " Electronic Devices and Circuits ", Tata McGraw-Hill Education

UIT-211: COMPUTER LAB – I

(Total Credits:1, Lectures/Week:0, Practical/Week:2)

Objectives: Use the variety of data types appropriate to specific programming problems. Utilize the modular features of the language. Demonstrate efficiency and readability. Demonstrate the use of the various control flow constructs.

Students should carry minimum 5 SMALL projects in C and Minimum 5 projects in C++ by using advanced concepts. Practical Examination shall be of three hours duration and consists the demonstration of a project and an oral based on the syllabus and term work.

Students should deliver at least one seminar on technical topic / non-technical topic of their interest or in concern with the guide / faculty in charge. They are expected to prepare power point presentation for their seminar topic.

UHS-221: HUMAN VALUES AND PROFESSIONAL ETHICS
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(Total Credits:2, Lectures/Week:2, Practical/Week:0)

Objectives: Making the students aware and sensitive to value system in real life situations. To help the students to discriminate between ephemeral and eternal values. To discriminate between essence and form.

Course Outcome: The students will be able to recognize importance of human values, harmony and ethical behaviour in real life situations

- 1. Course Introduction:** Need, Basic Guidelines, Content and Process for Value Education
 - Understanding the need, basic guidelines, content and process for Value Education.
 - A look at basic aspirations: Self Exploration, Happiness and Prosperity
 - Fulfilment of human aspirations and harmony

- 2. Understanding the Harmony:**
 - Thoughtful human being harmony, sentient, attitude and its importance in relationship
 - Significance of restraint and health (Yama and Niyama)
 - Human goal settings and life management techniques, existence and co-existence, trust, respect in universal order

- 3. Understanding professional Ethics:**
 - Harmony at various levels and understanding professional ethics
 - Creating environmental aware engineers
 - Humanistic universal education, natural acceptance of human values, ethical human conduct

- 4. Competence of professional ethics:**
 - Management models for present technologies, strategies for integrating humans in family and at all levels of existence
 - Relevance of the above strategies in becoming responsible engineers, technologists and managers

- 5. Motivation:**
 - Contribution of ancestors in science and technological development to raise self-esteem in Indian context.

Examination Scheme: 30* + 70 marks

*30 marks- The marks can be awarded on the basis of formal Mid term Examination or sessional or assignments as prescribed by the concerned subject teacher(s) and the course co-ordinator for the specific semester/ academic year.

Text / Reference Books:

1. R R Gaur, R Sangal, G P Bagaria, "A Foundation Course in Value Education", 2009.
2. A Nagraj, 1998, "Jeevan Vidya ek Parichay", Divya Path Sansthan, Amarkantak.
3. Sussan George, "How the Other Half Dies", Penguin Press, 1976, Reprinted 1986, 1991
4. PL Dhar, RR Gaur, "Science and Humanism", Commonwealth Purblishers,1990.
5. A.N. Tripathy, "Human Values", New Age International Publishers, 2003.
6. Subhas Palekar, "How to practice Natural Farming", Pracheen(Vaidik) Krishi Tantra Shodh, Amravati, 2000.
7. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, "Limits to Growth – Club of Rome’s report", Universe Books, 1972.
8. E G Seebauer & Robert L. Berry, "Fundamentals of Ethics for Scientists & Engineers", Oxford University Press, 2000.
9. M Govindrajran, S Natrajan & V.S. Senthil Kumar, "Engineering Ethics (including Human Values)", Eastern Economy Edition, Prentice Hall of India Ltd.
10. Subroto Bagchi, "The Professional", Penguin Books India.
11. B P Banerjee, "Foundations of Ethics and Management", Excel Books, 2005.
12. B L Bajpai, "Indian Ethos and Modern Management", New Royal Book Co., Lucknow, 2004, Reprinted 2008.

SEMESTER -IV

Course Code	Course Title	Lectures (L)	Tutorials (T)	Practical (P)	Credits	
					Th	Pr
UMA202	Differential Equations (BS)	04	--	--	04	--
UIT204	Computer Organization (CS)	03	01	--	04	--
UIT206	Microprocessors and Interfacing (CS)	03	--	02	03	01
UIT208	Java Programming (CS)	03	--	02	03	01
UIT210	Computer Laboratory-II (CS)	02	--	02	--	02
UIT212	Elective – I (Humanities / Basic Sciences) (HS)	03	--	--	03	--
UHS222	Professional Communication (HS)	02	--	02	02	01
	Total	19	01	10	19	05

UMA-202: DIFFERENTIAL EQUATIONS

(Total Credits:4, Lectures/Week:4, Practical/Week:0)

Objectives: To acquaint student with: the basic concepts of an ordinary differential equations, partial differential equations, Mathematical Modeling in physical problems. Initial and boundary value problems. Motivate students to use critical thinking skill to solve practical problems.

Outcomes: At the end of the course the student is expected to understand: Importance of differential equations i.e. ODE and PDE in physical problems. Able to solve IVP in electrical and mechanical problems. Analyzing physical phenomena in engineering and technology by using this theory.

1. Basic Concepts & Ideas, Geometric Meaning of $y = f(x, y)$, direction field, exact equations, Integrating factors, Linear differential equation, Bernoulli's equations, orthogonal trajectories, applications to electrical circuits.
2. Second Order Differential equations, Homogeneous linear differential equation for real & complex roots, Euler Cauchy equation, existence & uniqueness theorem (Without proof) & Wronskian.
3. Non homogeneous equation, solutions by undetermined coefficients & Variation of parameter methods, modelling, forced oscillation, resonance & electrical circuits, system of differential equations.
4. Fourier Series, Periodic function, Fourier theorem Euler's formulae for the Fourier coefficients, convergence of Fourier series, change of interval, even & odd function functions, half range Fourier series.
5. Partial differential equations, Separation of Variables, Vibrations of string, one dimensional equation.

Text/Reference Books:

1. R.K Jain & S.R.K Iyenger, "Advanced Engineering Mathematics", Narosa Publishing House Pvt. Ltd., New Delhi
2. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Publications.

3. W.E Boyce & R. Dprima, "Elementary Differential Equation", John Wiley, Eighth Edition, 2005.
4. R.V. Churchill & J. W. Brown, "Fourier series & boundary Valued Problems", Mc Graw Hill, Seventh edition, 2006.

UIT-204: COMPUTER ORGANIZATION

(Total Credits:3., Lectures/Week:3, Practical/Week:0)

Objectives: To have understanding of the basic structure and operation of a digital computer. To discuss in detail the operation of the arithmetic unit including the algorithms and to analyze the system performance. To learn implementation of fixed-point and floating-point addition, subtraction, multiplication and division. To study the different ways of communicating with I/O devices interfaces. To study the hierarchical memory system including cache memories and virtual memory. To learn pipelining structure and parallel processing.

1. **Introduction to Computer Systems** : Historical Background , Architectural Development and Styles ,Technological Development, Performance Measures
2. **Instruction Set Architecture and Design** : Memory Locations and Operations, Addressing Modes , Instruction Types, Programming Examples
3. **Computer Arithmetic** : Number Systems, Integer Arithmetic, Floating-Point Arithmetic.
4. **Processing Unit Design** : CPU Basics, Register Set, Data path, CPU Instruction Cycle, Control Unit.
5. **Memory System Design I** : Basic Concepts ,Cache Memory
6. **Memory System Design II** : Main Memory, Virtual Memory, Read-Only Memory
7. **Input– Output Design and Organization** : Basic Concepts, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access (DMA), Buses, Input –Output Interfaces.
8. **Pipeline Design Techniques** : General Concepts, Instruction Pipeline, Example of Pipeline processors, Instruction Level Parallelism, Arithmetic Pipeline

Text / Reference Books :

1. Mostafa Abd-El Barr, " Fundamentals of Computer Organization and Architecture", Willy Publications.
2. John P. Haze, "Computer Architecture and Organization", McGraw Hill.
3. Haze and Zaky, "Computer Organization", TMH.
4. William Stalling, "Computer Organization and Architecture", PHI.

UIT-206: MICROPROCESSORS AND INTERFACING

(Total Credits:4, Lectures/Week:3, Practical/Week:2)

Objectives: The objective of this course is to introduce the basic concepts of microprocessor and assembly language programming. This course is introduced with an aim to give extensive knowledge of microprocessor based systems and interfacing techniques, to investigate the programmer's model of a microprocessor and appreciate methods of connecting common peripheral devices, and to understand the ways in which microprocessors can be used in

automated systems.

- 1. The 8085A Microprocessor Basics:** Evolution of Microprocessor, Architecture of 8085A microprocessor, Pin configuration, the 8085A timing diagrams, State diagram, Memory and I/O synchronization, logic levels, loading and Buffering, The 8085 Instruction set, Interrupt structure of 8085.
- 2. Assembly Language Programming:** Concepts of program assembly and testing, simple programs with and without loops, Arithmetic problems, stacks and subroutines, Delay subroutines.
- 3. Memory Interfacing with 8085A:** Memory mapped I/O and I/O mapped I/O, memory system Design, Exhaustive and Partial decoding, Design Examples.
- 4. Fundamental of I/O Interfacing:** :Data transfer schemes, Programmable Interfacing Chips: 8155, 8355, 8755, 8255 & 8279, A to D and D to A Conversion Methods, Interfacing of ADCs and DACs with 8085.
- 5. 8086 Microprocessor Basics:** Internal microprocessor architecture of 8086; Programming Model, Addressing modes: Data, program, Stack, memory-addressing modes, Overview of the Instruction set of 8086, Assembly language programming for 8086 microprocessor (some sample programs), Introduction to Real mode memory addressing and protected mode memory addressing, memory paging.

Term Work:

Term work shall consist of 15 experiments based on the above syllabus. Typically the experiments to be done should be for applications where the concept of each chapter is to be used. Practical examination shall be of 3 hours duration and shall consist of an experiment and the oral based on the Syllabus.

Text/Reference Books:

1. Kenneth L. Short, "Microprocessors and Programmed Logic" PH I.
2. B. RAM, "Microprocessors and Microcomputers", Dhanpat Rai Publications.
3. Kulkarni U.V. Sontakke T.R., "The 8085A Basics, Programming and Interfacing", Sadhusudha Prakashan.
4. Hall D.V., "Microprocessors and Digital Systems", Mcgraw-Hill Book Company.
5. Gaonkar Ramesh, "Microprocessor, Interfacing and Applications", Prentice Hall.

UIT-208: CORE JAVA

(Total Credits:4, Lectures/Week:3, Practical/Week:2)

Objectives: The objectives of this course include the following experience learning a programming language "on your own" as is commonly the case in industry understand the syntax and semantics of the Java language understand how to develop and implement (web) applets and application programs in the Java language. Understand various forms of data, control and object structures supported by the Java language recognize similarities and common characteristics between Java and other programming languages. comprehend the art of programming and, in particular, the structure and meaning of basic Java programs. modify, compile, debug, and execute Java programs.

- 1. An Introduction to Java :** Java as a Programming Tool, Advantages of Java, The Java "White Paper" Buzzwords, Java and the Internet

2. **The Java Programming Environment :** Installing the Java Software Development Kit, Development Environments, Using the Command Line Tools, Using an Integrated Development Environment, Compiling and Running Programs from a Text Editor, Graphical Applications, Applets
3. **Fundamental Programming Structures in Java :** A Simple Java Program, Comments, Data Types, Variables, Assignments and Initializations , Operators, Strings., Control Flow, Big Numbers, Arrays.
4. **Objects and Classes.:** Introduction to Object-Oriented Programming, Using Existing Classes, Building Your Own Classes, Static Fields and Methods, Method Parameters, Object Construction, Packages, Documentation Comments, Class Design Hints.
5. **Inheritance:** Extending Classes, Object: The Cosmic Super class, The Class, Reflection, Design Hints for Inheritance.
6. **Interfaces and Inner Classes:** Interfaces, Object Cloning, Inner Classes, Proxies.
7. **Graphics Programming:** Introduction to Swing, Creating a Frame, Frame Positioning, Displaying Information in a Panel, 2D Shapes, Colors, Text and Fonts, Images.
8. **Event Handling :** Basics of Event Handling, The AWT Event Hierarchy, Semantic and Low-Level Events in the AWT, Low-Level Event Types , Actions, Multicasting, The Event Queue.
9. **User Interface Components with Swing:** The Model-View-Controller Design Pattern, An Introduction to Layout Management, Text Input, Making Choices, Menus, Sophisticated Layout Management, Dialog Boxes,
10. **Applets:** Applet Basics, The Applet HTML Tags and Attributes, Multimedia, The Applet Context, JAR Files
11. **Exceptions and Debugging :** Dealing with Errors, Catching Exceptions, Some Tips on Using Exceptions, Debugging Techniques, Using a Debugger
12. **Streams and Files :** Streams, The Complete Stream Zoo, ZIP File Streams, Putting Streams to Use Object Streams, File Management

Term Work:

Term work shall consist of 15 experiments based on the above syllabus. Typically the experiments to be done should be for applications where the concept of each chapter is to be used. Practical examination shall be of 3 hours duration and shall consist of an experiment and the oral based on the Syllabus.

Text/Reference Books:

1. Herbet Schildt, "JAVA: Complete Reference", TMH, India.
2. Cay S. Horstmann, Gary Cornell, "Core Java", Sun Publication, India.
3. Deital and Deital, "Java How to program", Pearson Education.

UIT-210: COMPUTER LABORATORY-II
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(Total Credits:1, Lectures/Week:2, Practical/Week:2)

Selected Language: Web Designing S/W - HTML-5, CSS, Word Press, Blogger.

Students are expected to perform minimum 15 experiments using the above software. They are also expected to develop their own blog. Practical examination shall be of 3 hours duration and shall consist of an experiment/ demonstration of the project carried and the oral based on the above syllabus and term work.

UIT-212: Elective – I (Humanities / Basic Sciences)
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(Total Credits:2., Lectures/Week:2, Practical/Week:0)

UIT212 A: Elements of Indian History for Engineers

Objectives: The objective of this course is to familiarize the prospective engineers with elements of Indian history and sociological concepts and theories by which they could understand contemporary issues and problems in Indian society. The course would enable them to analyze critically the social processes of globalization, modernization and social change. All of this is a part of the quest to help the students imbibe such skills that will enhance them to be better citizens and human beings at their work place or in the family or in other social institutions.

- 1. Introduction:** What is history?; History Sources- Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography.
2. Introduction to sociological concepts-structure, system, organization, social institutions, Culture social stratification (caste, class, gender, power).State & civil society.
- 3. Indian history & periodization:** Evolution of urbanization process first, second & third phase of urbanization; Evolution of polity; early states to empires; Understanding social structures- feudalism debate.
- 4. Political economy of Indian society:** Industrial, Urban, Agrarian and Tribal society, Caste, Class, Ethnicity and Gender; Ecology and Environment.
- 5. Social change in contemporary India:** Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, Changing nature of work and organization.

Text/Reference Books:

1. Desai, A.R., "Social Background of Indian Nationalism", Popular Prakashan. 2005.
2. Guha, Ramachandra, "India After Gandhi", Pan Macmillan, 2007.
3. Thapar, Romila, "Early India", Penguin, 2002.
4. Sharma R.S., "Indian Feudalism", Macmillan, 1965.
5. Deshpande Satish, "Contemporary India: A Sociological View", Viking, 2002.
6. Gadgil, Madhav & Ramachandra Guha, "This Fissured Land: An Ecological History of India", OU Press, 1993.

UIT212 B: Law for Engineers

Objectives: The objective of the course is to familiarize students (Prospective engineers) with elementary knowledge of laws that would be of utility in their profession. The syllabus covers Constitution of India and new areas of law like IPR, ADR, Human Rights, Right to Information, Corporate law, Law relating Elections and Gender Studies. To be supplemented by the historical development of laws wherever required.

- 1. Constitutional Law covering the Preamble:** Fundamental Rights, Judicial Activism including Equality and Social Justice, Life and Personal Liberty and Secularism; Directive principles of State policy; Fundamental Duties; Emergency provisions – kinds, legal requirements and legal effects.
- 2. Human Rights and Public International Law:** Historical development of human rights; Covenant on Civil & Political Rights 1966. UN Mechanism and specialized agencies,

(UNICEF, UNESCO, WHO, ILO, FAO, etc.); International NGOs. Enforcement of Human Rights in India.

3. **Indian Contract Act:** Government contracts and dispute settlement, Standard form contracts; nature, advantages, unilateral character, principles of protection; Arbitration, Conciliation and ADR system.
4. **Law relating to Intellectual property:** main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets.
5. **Right to Information Act, 2005 covering:** Evolution and concept; Practice and procedures; Official Secret Act, 1923; Indian Evidence Act, 1872; Information Technology – legislation and procedures, Cyber crimes – issues and investigations.
6. **Labor Laws:** covering Industrial Disputes Act; Corporate Law, covering Meaning of corporation; Law relating to companies, public and private.
7. **Election provisions:** Indian Constitution (Art.324–329) related to election provisions, covering Representation of Peoples Act and Prevention of Corruption Act, Gender Studies, International and national perspective; Laws relating women.

Text/Reference Books:

1. M.P. Jain, "Indian Constitutional Law", Wadhwa & Co., 2005.
2. Agarwal H.O., "International Law and Human Rights", Central Law Publications, 2008.
3. S.K. Awasthi & R.P. Kataria, "Law relating to Protection of Human Rights", Orient Publishing, 2006.
4. Avtarsingh, "Law of Contract", Eastern Book Co., 2002.
5. Model Law on Arbitration, Indian Council of Arbitration
6. Bare text, Right to Information Act, 2005.
7. K.M. Desai, "The Industrial Employment (Standing Orders) Act", 1946.
8. Sethna, "Indian Company Law"
9. Agnes Flavia, "Law and Gender Inequality - The Politics of Womens' Rights in India", OU Press, 1999.

UIT212 C: Economics for Engineers

Objectives: The objective of this course is to familiarize the prospective engineers with elementary principles of economics. It also deals with acquainting the students with standard concepts and tools that they are likely to find useful in their profession when employed in the firm/industry/corporation in public or private sector. It also seeks to create and awareness about the status of the current economic parameters /indicators/ policy debates. All of this is a part of the quest to help the students imbibe soft skills that will enhance their employability.

1. **Basic Principles and Methodology of Economics:** Demand/Supply – elasticity – Government Policies and Application. Theory of the Firm and Market Structure. Basic Macro-economic Concepts (including GDP/GNP/NI/Disposable Income) and Identities for both closed and open economies. Aggregate demand and Supply (IS/LM). Price Indices (WPI/CPI), Interest rates, Direct and Indirect Taxes.
2. **Public Sector Economics:** Welfare, Externalities, Labor Market, Components of Monetary and Financial System, Central Bank – Monetary Aggregates; Commercial Banks & their functions; Capital and Debt Markets. Monetary and Fiscal Policy Tools & their impact on the economy – Inflation and Phillips Curve.

3. **Elements of Business/Managerial Economics and forms of organizations:** Cost & Cost Control – Techniques, Types of Costs, Budgets, Break even Analysis, Capital Budgeting, Application of Linear Programming. Investment Analysis – NPV, ROI, IRR, Payback Period, Depreciation, Time value of money. Business Forecasting – Elementary techniques. Statements – Cash flow, Financial. Case Study Method.
4. **Indian economy:** Brief overview of post-independence period – plans. Post reform Growth, Structure of productive activity. Issues of Inclusion – Sectors, States/Regions, Groups of people (M/F), Urbanization. Employment–Informal, Organized, Unorganized, Public, Private. Challenges and Policy Debates in Monetary, Fiscal, Social, External sectors.

Text/Reference Books:

1. Mankiw Gregory N., "Principles of Economics", Thompson Asia, 2002.
2. V. Mote, S. Paul, G. Gupta, "Managerial Economics", Tata McGraw Hill, 2004.
3. Misra, S.K. and Puri, "Indian Economy", Himalaya, 2009.
4. Pareek Saroj, "Textbook of Business Economics", Sunrise Publishers, 2003.

UIT212 D: Indian Constitution:

Objectives: The objective of this course is to make students understand the ideals and values of the Indian Constitution in all spheres of life, both public and private, including that of individuals, to facilitate the practice of the ideals and values of the Indian Constitution and to further the objectives and goals of the constitutionalism, unity in diversity, social justice and substantive equality.

1. **Historical Background :** Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.
2. **Union Government :** Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.
3. **State Government:** Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.
4. **Indian Federal System:** Center – State Relations – President’s Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India.
5. **Society:** Nature, Meaning and definition; Indian Social Structure; Caste, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.

Text/Reference books:

1. Durga Das Basu, “Introduction to the Constitution of India “, Prentice Hall of India, New Delhi.
2. R. C. Agarwal, “Indian Political System”, S.Chand and Company, New Delhi.
3. Maciver and Page, “ Society: An Introduction Analysis ”, Mac Milan India Ltd., New Delhi, 1997.
4. K. L. Sharma, “Social Stratification in India: Issues and Themes”, Jawaharlal Nehru University, New Delhi, 1997
5. Sharma, Brij Kishore, “Introduction to the Constitution of India:, Prentice Hall of India, New Delhi.
6. U. R. Gahai, “Indian Political System “, New Academic Publishing House, Jalandhar.

7. R.N. Sharma, "Indian Social Problems", Media Promoters and Publishers Pvt. Ltd.

UIT212 E: Cyber Law

Objectives: The objectives of introducing this course is to provide knowledge to the students in the field of cyber crimes, cyber security and cyber laws and its emerging trend in addition to the legal measures and the types of cyber crimes. To initiate a serious debate on how to combat the tendency of netizens to commit cyber crimes. To address the latest threats, impacts, growing complexity and the emerging information on cyber laws, cyber security and cyber crimes.

1. **Introduction:** Cyber Security and its problem-Intervention Strategies: Redundancy, Diversity and Autarchy.
2. Private ordering solutions, Regulation and Jurisdiction for global Cyber security, Copy Right-source of risks, Pirates, Internet Infringement, Fair Use, postings, criminal liability, First Amendments, Data Losing.
3. Trademarks, Defamation, Privacy-Common Law Privacy, Constitutional law, Federal Statutes, Anonymity, Technology expanding privacy rights.
4. Duty of Care, Criminal Liability, Procedural issues, Electronic Contracts & Digital Signatures, Misappropriation of information, Civil Rights, Tax, Evidence.
5. Ethics, Legal Developments, Late 1990 to 2000, Cyber security in Society, Security in cyber laws case studies, General law and Cyber Law-a Swift Analysis.

Text/Reference books:

1. Jonathan Rosenoer, "Cyber Law: The law of the Internet", Springer-Verlag, 1997.
2. Mark F Grady, Fransesco Parisi, "The Law and Economics of Cyber Security", Cambridge University Press, 2006.

UHS-222: PROFESSIONAL COMMUNICATION
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(Total Credits:3, Lectures/Week:2, Practical/Week:2)

Objectives: To enable students to speak and write English with a good level of proficiency. To build confidence in students to face interview, deliver speech, make presentation and participate in meeting and discussion. To lay a strong foundation on the subject by revising and correcting the basics.

1. **Functional Grammar:** Building of a sentence and its components, Tense- the time sense: Present, Past and Future tense with uses and applications, Verbs, Noun, Pronoun, Adjective, Adverb, Prepositions and Conjunctions: classification, identifications, uses and applications Active & Passive voice, direct and indirect speech, clause, principles of effective communication.
2. **Listening Skills:** Requirements of listening skill, Phonetics and phonology, Articulation of consonants and vowels, Syllables, Weak form stress, Rhythm and intonation, Face to face conversation, Telephonic conversation.
3. **Reading Skills:** Requirements of reading skill, Reading poetry, Reading prose, Reading article from standard news paper/ magazine

4. **Writing Skill:** Paragraph, Resumes, Letters- formal and informal, Circular, Notice, Agendas, Minutes, Reports, E-mail and Blog writing.
5. **Speaking Skills:** Requirement of speaking skills, Grammatical difficulties, Practice of public speaking, Conversation between /among students or groups on given situations.
6. **Integration of skills:** Group discussion, Personal interview, Debate and Quiz competition, PPT Presentation.

Practicals and Assignments:

1. Practice of building of sentences and identification of components
2. Practice the uses and applications of tense
3. Identification of parts of speech and form changes- use in sentences
4. Identification of various clauses and their use in sentences
5. **Listening Skills:** Listen few BBC / Voice of America/ NDTV 24*7 or similar standard Television channel / Radio or any standard talk/discussion available in CD/DVD and answer the given questions/ write the summary.
6. **Reading Skills:** Read few articles from standard news paper The Hindu/ The Times of India / magazine /books and answer the given questions /write the summary.
7. **Writing Skills: (Assignments)**
 - a. Write your own CV
 - b. Write an E-mail
 - c. Write a blog on current topic of discussion
 - d. Write a technical report
 - e. Write a letter
 - f. Comprehension Tests
8. **Speaking and Integration of Skills:**
 - a. Converse on few given situations
 - b. Group Discussions on a given topic
 - c. Debate competition on a given topic
 - d. Quiz competition among few groups of students
 - e. PPT presentation

Text/Reference Books:

1. Raymond Murphy, "Essential English Grammar", Cambridge University Press, 1 December, 2007.
2. Michael Swan and Catherine Walter, "Oxford English Grammar Course: Advanced", Oxford, 24 February, 2012.
3. Martin Hewings, "Advanced English Grammar", Cambridge University Press, 1 December, 2007.
4. Krishna Mohan and Meera Banerjee, "Developing Communication Skills", Macmillan, India Ltd, New Delhi, 2nd Edition, 2009.
5. Oxford Advanced Learner's Dictionary, 8th Edition.