

<b>Computer Organization and Architecture (KCS302)</b>		
<b>Course Outcome ( CO)</b>		<b>Bloom's Knowledge Level (KL)</b>
<b>At the end of course , the student will be able to understand</b>		
CO 1	Study of the basic structure and operation of a digital computer system.	K <sub>1</sub> , K <sub>2</sub>
CO 2	Analysis of the design of arithmetic & logic unit and understanding of the fixed point and floating-point arithmetic operations.	K <sub>2</sub> , K <sub>4</sub>
CO 3	Implementation of control unit techniques and the concept of Pipelining	K <sub>3</sub>
CO 4	Understanding the hierarchical memory system, cache memories and virtual memory	K <sub>2</sub>
CO 5	Understanding the different ways of communicating with I/O devices and standard I/O interfaces	K <sub>2</sub> , K <sub>4</sub>
<b>DETAILED SYLLABUS</b>		<b>3-1-0</b>
<b>Unit</b>	<b>Topic</b>	<b>Proposed Lecture</b>
<b>I</b>	<b>Introduction:</b> Functional units of digital system and their interconnections, buses, bus architecture, types of buses and bus arbitration. Register, bus and memory transfer. Processor organization, general registers organization, stack organization and addressing modes.	<b>08</b>
<b>II</b>	<b>Arithmetic and logic unit:</b> Look ahead carries adders. Multiplication: Signed operand multiplication, Booths algorithm and array multiplier. Division and logic operations. Floating point arithmetic operation, Arithmetic & logic unit design. IEEE Standard for Floating Point Numbers	<b>08</b>
<b>III</b>	<b>Control Unit:</b> Instruction types, formats, instruction cycles and sub cycles (fetch and execute etc), micro operations, execution of a complete instruction. Program Control, Reduced Instruction Set Computer, Pipelining. Hardwire and micro programmed control: micro programme sequencing, concept of horizontal and vertical microprogramming.	<b>08</b>
<b>IV</b>	<b>Memory:</b> Basic concept and hierarchy, semiconductor RAM memories, 2D & 2 1/2D memory organization. ROM memories. Cache memories: concept and design issues & performance, address mapping and replacement Auxiliary memories: magnetic disk, magnetic tape and optical disks Virtual memory: concept implementation.	<b>08</b>
<b>V</b>	<b>Input / Output:</b> Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions. Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access., I/O channels and processors. Serial Communication: Synchronous & asynchronous communication, standard communication interfaces.	<b>08</b>
<b>Text books:</b>		
<ol style="list-style-type: none"> <li>1. Computer System Architecture - M. Mano</li> <li>2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky Computer Organization, McGraw-Hill, Fifth Edition, Reprint 2012</li> <li>3. John P. Hayes, Computer Architecture and Organization, Tata McGraw Hill, Third Edition, 1998. Reference books</li> <li>4. William Stallings, Computer Organization and Architecture-Designing for Performance, Pearson Education, Seventh edition, 2006.</li> <li>5. Behrooz Parahami, "Computer Architecture", Oxford University Press, Eighth Impression, 2011.</li> <li>6. David A. Patterson and John L. Hennessy, "Computer Architecture-A Quantitative Approach", Elsevier, a division of reed India Private Limited, Fifth edition, 2012</li> <li>7. Structured Computer Organization, Tannenbaum(PHI)</li> </ol>		

**B.TECH. (INFORMATION TECHNOLOGY)**  
**THIRD SEMESTER (DETAILED SYLLABUS)**

<b>DATA STRUCTURE (KCS301)</b>		
<b>Course Outcome ( CO)</b>		<b>Bloom's Knowledge Level (KL)</b>
<b>At the end of course , the student will be able to understand</b>		
<b>CO 1</b>	Describe how arrays, linked lists, stacks, queues, trees, and graphs are represented in memory, used by the algorithms and their common applications.	<b>K<sub>1</sub>, K<sub>2</sub></b>
<b>CO 2</b>	Discuss the computational efficiency of the sorting and searching algorithms.	<b>K<sub>2</sub></b>
<b>CO 3</b>	Implementation of Trees and Graphs and perform various operations on these data structure.	<b>K<sub>3</sub></b>
<b>CO 4</b>	Understanding the concept of recursion, application of recursion and its implementation and removal of recursion.	<b>K<sub>4</sub></b>
<b>CO 5</b>	Identify the alternative implementations of data structures with respect to its performance to solve a real world problem.	<b>K<sub>5</sub>, K<sub>6</sub></b>
<b>DETAILED SYLLABUS</b>		<b>3-1-0</b>
<b>Unit</b>	<b>Topic</b>	<b>Proposed Lecture</b>
<b>I</b>	<p><b>Introduction:</b> Basic Terminology, Elementary Data Organization, Built in Data Types in C. Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations: Big Oh, Big Theta and Big Omega, Time-Space trade-off. Abstract Data Types (ADT)</p> <p><b>Arrays:</b> Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Derivation of Index Formulae for 1-D,2-D,3-D and n-D Array Application of arrays, Sparse Matrices and their representations.</p> <p><b>Linked lists:</b> Array Implementation and Pointer Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Polynomial Representation and Addition Subtraction &amp; Multiplications of Single variable &amp; Two variables Polynomial.</p>	08
<b>II</b>	<p><b>Stacks:</b> Abstract Data Type, Primitive Stack operations: Push &amp; Pop, Array and Linked Implementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Iteration and Recursion- Principles of recursion, Tail recursion, Removal of recursion Problem solving using iteration and recursion with examples such as binary search, Fibonacci numbers, and Hanoi towers. Tradeoffs between iteration and recursion.</p> <p><b>Queues:</b> Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Dequeue and Priority Queue.</p>	08
<b>III</b>	<p><b>Searching:</b> Concept of Searching, Sequential search, Index Sequential Search, Binary Search. Concept of Hashing &amp; Collision resolution Techniques used in Hashing. <b>Sorting:</b> Insertion Sort, Selection, Bubble Sort, Quick Sort, Merge Sort, Heap Sort and Radix Sort.</p>	08
<b>IV</b>	<p><b>Graphs:</b> Terminology used with Graph, Data Structure for Graph Representations: Adjacency Matrices, Adjacency List, Adjacency. Graph Traversal: Depth First Search and Breadth First Search, Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm. Transitive Closure and Shortest Path algorithm: Warshal Algorithm and Dijkstra Algorithm.</p>	08

V	<p><b>Trees:</b> Basic terminology used with Tree, Binary Trees, Binary Tree Representation: Array Representation and Pointer(Linked List) Representation, Binary Search Tree, Strictly Binary Tree ,Complete Binary Tree . A Extended Binary Trees, Tree Traversal algorithms: Inorder, Preorder and Postorder, Constructing Binary Tree from given Tree Traversal, Operation of Insertation , Deletion, Searching &amp; Modification of data in Binary Search . Threaded Binary trees, Traversing Threaded Binary trees. Huffman coding using Binary Tree. Concept &amp; Basic Operations for AVL Tree , B Tree &amp; Binary Heaps</p>	08
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**Text books:**

1. Aaron M. Tenenbaum, Yedidiah Langsam and Moshe J. Augenstein, “Data Structures Using C and C++”, PHI Learning Private Limited, Delhi India
2. Horowitz and Sahani, “Fundamentals of Data Structures”, Galgotia Publications Pvt Ltd Delhi India.
3. Lipschutz, “Data Structures” Schaum’s Outline Series, Tata McGraw-hill Education (India) Pvt. Ltd.
4. Thareja, “Data Structure Using C” Oxford Higher Education.
5. AK Sharma, “Data Structure Using C”, Pearson Education India.
6. Rajesh K. Shukla, “Data Structure Using C and C++” Wiley Dreamtech Publication.
7. Michael T. Goodrich, Roberto Tamassia, David M. Mount “Data Structures and Algorithms in C++”, Wiley India.
8. P. S. Deshpandey, “C and Data structure”, Wiley Dreamtech Publication.
9. R. Kruse et al, “Data Structures and Program Design in C”, Pearson Education.
10. Berztiss, AT: Data structures, Theory and Practice, Academic Press.
11. Jean Paul Trembley and Paul G. Sorenson, “An Introduction to Data Structures with applications”, McGraw Hill.
12. Adam Drozdek “Data Structures and Algorithm in Java”, Cengage Learning

# RCS301: DISCRETE STRUCTURES & THEORY OF LOGIC

## UNIT I

**Set Theory:** Introduction, Combination of sets, Multi sets, ordered pairs, Set Identities.

**Relations:** Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Order of relations.

**Functions:** Definition, Classification of functions, Operations on functions, Recursively defined functions.

**Natural Numbers:** Introduction, Mathematical Induction, Variants of Induction, Induction with Nonzero Base cases.

## UNIT II

**Algebraic Structures:** Definition, Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Group Homomorphism's, Definition and elementary properties of Rings and Fields, Integers Modulo n.

## UNIT III

**Partial order sets:** Definition, Partial order sets, Combination of partial order sets, Hasse diagram.

**Lattices:** Definition, Properties of lattices – Bounded, Complemented, Modular and Complete Lattice, Morphisms of lattices.

**Boolean Algebra:** Introduction, Axioms and Theorems of Boolean algebra, Algebraic manipulation of Boolean expressions. Simplification of Boolean Functions, Karnaugh maps, Logic gates, Digital circuits and Boolean algebra. Combinational and sequential Circuits.

## UNIT IV

**Propositional Logic:** Proposition, well formed formula, Truth tables, Tautology, Satisfiability, Contradiction, Algebra of proposition, Theory of Inference, Natural Deduction.

**Predicate Logic:** First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic.

## UNIT V

**Trees:** Definition, Binary tree, Binary tree traversal, Binary search tree.

**Graphs:** Definition and terminology, Representation of graphs, Multi graphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloring.

**Recurrence Relation & Generating function:** Recursive definition of functions, Recursive algorithms, Method of solving recurrences.

**Combinatorics:** Introduction, Counting Techniques, Pigeonhole Principle

## References:

1. Liu and Mohapatra, "Elements of Discrete Mathematics", McGraw Hill
2. Jean Paul Trembley, R Manohar, "Discrete Mathematical Structures with Application to Computer Science", McGraw-Hill
3. YN Singh, "Discrete Mathematical Structures", Wiley India, New Delhi, First Edition, August 2010.
4. RP Grimaldi, Discrete and Combinatorial Mathematics, Addison Wesley,

<b>Electronics Engineering</b>	<b>3L:1T:0P</b>	<b>4 Credits</b>
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<b>Unit</b>	<b>Topics</b>	<b>Lectures</b>
<b>I</b>	PN junction diode: Introduction of semiconductor materials; Semiconductor diode: Depletion layer, V-I characteristics, ideal and practical, diode resistance, capacitance, diode equivalent circuits, transition and diffusion capacitance, Zener diodes breakdown mechanism (Zener and avalanche).	8
<b>II</b>	Diode application: Series, parallel and series, parallel diode configuration, half and full wave rectification, clippers, clampers, Zener diode as shunt regulator, voltage-multiplier circuits special purpose two terminal devices : light-emitting diodes, Varactor (Varicap) diodes, tunnel diodes, liquid-crystal displays.	8
<b>III</b>	Bipolar junction transistors and field effect transistor: Bipolar junction transistor: Transistor construction, operation, amplification action, common base, common emitter, common collector configuration dc biasing BJTs: operating point, fixed-bias, emitter bias, voltage-divider bias configuration. Collector feedback, emitter-follower configuration. Bias stabilization. CE, CB, CC amplifiers and AC analysis of single stage CE amplifier (re Model), Field effect transistor: Construction and characteristic of JFETs. AC analysis of CS amplifier, MOSFET (depletion and enhancement) type, transfer characteristic.	8
<b>IV</b>	Operational amplifiers: Introduction and block diagram of Op-Amp, ideal & practical characteristics of Op-Amp, differential amplifier circuits, practical Op-Amp circuits (inverting amplifier, non-inverting amplifier, unity gain amplifier, summing amplifier, integrator, differentiator), Op-Amp parameters: input offset voltage, output offset voltage, input biased current, input offset current differential and common-mode operation.	8
<b>V</b>	Electronic instrumentation and measurements: Digital voltmeter: Introduction, RAMP techniques digital multimeters: Introduction Oscilloscope: introduction, basic principle, CRT, block diagram of oscilloscope, simple, measurement of voltage, current phase and frequency using CRO, introduction of digital storage oscilloscope and comparison of DSO with analog oscilloscope.	8

**Text /Reference Books:**

1. Robert L. Boylestand / Louis Nashelsky, "Electronic Devices and Circuit Theory," Latest Edition, Pearson Education.
2. H S Kalsi, "Electronic Instrumentation", Latest Edition, TMH Publication.
3. Meetidehran/ A.K. singh "fundamental of electronics Engineering", New age international publisher.

**Course Outcomes:**

At the end of this course students will demonstrate the ability to:

1. Understand the concept of PN junction and special purpose diodes.
  2. Study the application of conventional diode and semiconductor diode.
  3. Analyse the I-V characteristics of BJT and FET.
  4. Analyzethe of Op-Amp, amplifiers, integrator, and differentiator.
  5. Understand the concept of digital storage oscilloscope and compare of DSO with analog oscilloscope
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**A Foundation course  
In  
Universal Human Values and Professional Ethics**

**Universal Human Values and Professional Ethics**

**[L-T-P: 3-0-0]**

**Course Objectives**

This introductory course input is intended

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature

Thus, this course is intended to provide a much needed orientational input in value education to the young enquiring minds.

**Course Methodology**

1. The methodology of this course is explorational and thus universally adaptable. It involves a systematic and rational study of the human being vis-à-vis the rest of existence.
2. It is free from any dogma or value prescriptions.
3. It is a process of self-investigation and self-exploration, and not of giving sermons. Whatever is found as truth or reality is stated as a proposal and the students are facilitated to verify it in their own right, based on their Natural Acceptance and subsequent Experiential Validation.
4. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student leading to continuous self-evolution.
5. This self-exploration also enables them to critically evaluate their pre-conditionings and present beliefs.

## **Course Syllabus: Universal Human Values and Professional Ethics [L-T-P: 3-0-0]**

The whole course is divided into 5 modules.

After every two lectures of one hour each, there is a 2 hour practice session.

The teachers are oriented to the inputs through an eight to ten day workshop (Teachers' Orientation Program).

The Teacher's Manual provides them the lecture outline. The outline has also been elaborated into presentations and provided in a DVD with this book to facilitate sharing.

The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue. The process of dialogue is enriching for both, the teacher as well as the students.

The syllabus for the lectures is given below:

### **UNIT 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self Exploration—what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in **harmony** at various levels

## **UNIT 2: Understanding Harmony in the Human Being - Harmony in Myself!**

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
8. Understanding the needs of Self ('I') and 'Body' - *Sukh* and *Suvidha*
9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of 'I' and harmony in 'I'
11. Understanding the harmony of I with the Body: *Sanyam* and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure *Sanyam* and *Swasthya*
  - Practice Exercises and Case Studies will be taken up in Practice Sessions.

## **UNIT 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship**

13. *Understanding Harmony in the family – the basic unit of human interaction*
14. Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*;  
Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship
15. Understanding the meaning of *Vishwas*; Difference between intention and competence
16. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship
17. Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals
18. Visualizing a universal harmonious order in society- Undivided Society (*Akhand Samaj*), Universal Order (*Sarvabhaum Vyawastha* )- from family to world family!
  - Practice Exercises and Case Studies will be taken up in Practice Sessions.

## **UNIT 4: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence**

19. Understanding the harmony in the Nature
20. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
21. Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space
22. Holistic perception of harmony at all levels of existence
  - Practice Exercises and Case Studies will be taken up in Practice Sessions.



## **UNIT 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics**

23. Natural acceptance of human values
24. Definitiveness of Ethical Human Conduct
25. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
26. Competence in professional ethics:
  - a) Ability to utilize the professional competence for augmenting universal human order
  - b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
  - c) Ability to identify and develop appropriate technologies and management patterns for above production systems.
27. Case studies of typical holistic technologies, management models and production systems
28. Strategy for transition from the present state to Universal Human Order:
  - a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers
  - b) At the level of society: as mutually enriching institutions and organizations

### **Guidelines and Content for Practice Sessions**

#### **UNIT 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**

**PS 1:** Introduce yourself in detail. What are the goals in your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your achievements and shortcomings in your life? Observe and analyze them.

**Expected outcome:** the students start exploring themselves; get comfortable to each other and to the teacher and start finding the need and relevance for the course.

**PS 2:** Now-a-days, there is a lot of voice about many techno-genic maladies such as energy and natural resource depletion, environmental pollution, global warming, ozone depletion, deforestation, soil degradation, etc. – all these seem to be man-made problems threatening the survival of life on Earth – What is the root cause of these maladies & what is the way out in your opinion?

On the other hand, there is rapidly growing danger because of nuclear proliferation, arms race, terrorism, criminalization of politics, large scale corruption, scams, breakdown of relationships, generation gap, depression & suicidal attempts, etc – what do you think, is the root cause of these threats to human happiness and peace – what could be the way out in your opinion?

**Expected outcome:** the students start finding that technical education without study of human values can generate more problems than solutions. They also start feeling that lack of understanding of human values is the root cause of all problems and the sustained

solution could emerge only through understanding of human values and value based living. Any solution brought out through fear, temptation or dogma will not be sustainable.

**PS 3:**

1. Observe that each one of us has Natural Acceptance, based on which one can verify right or not right for him. Verify this in case of

- i) What is Naturally Acceptable to you in relationship- Feeling of respect or disrespect?
- ii) What is Naturally Acceptable to you – to nurture or to exploit others?

Is your living the same as your natural acceptance or different?

2. Out of the three basic requirements for fulfillment of your aspirations- right understanding, relationship and physical facilities, observe how the problems in your family are related to each. Also observe how much time & effort you devote for each in your daily routine.

**Expected outcome:**

- 1. The students are able to see that verification on the basis of natural acceptance and experiential validation through living is the only way to verify right or wrong, and referring to any external source like text or instrument or any other person cannot enable them to verify with authenticity; it will only develop assumptions.
- 2. The students are able to see that their practice in living is not in harmony with their natural acceptance most of the time, and all they need to do is to refer to their natural acceptance to remove this disharmony.
- 3. The students are able to see that lack of right understanding leading to lack of relationship is the major cause of problems in their family and not the lack of physical facilities in most of the cases, while they have given higher priority to earning of physical facilities in their life ignoring relationships and not being aware that right understanding is the most important requirement for any human being.

**UNIT 2: Understanding Harmony in the Human Being - Harmony in Myself!**

**PS 4:** List down all your desires. Observe whether the desire is related to Self (I) or Body. If it appears to be related to both, see which part of it is related to Self (I) and which part is related to Body.

**Expected outcome:** the students are able to see that they can enlist their desires and the desires are not vague. Also they are able to relate their desires to 'I' and 'Body' distinctly. If any desire appears related to both, they are able to see that the feeling is related to I while the physical facility is related to the body. They are also able to see that 'I' and 'Body' are two realities, and most of their desires are related to 'I' and not body, while their efforts are mostly centered on the fulfillment of the needs of the body assuming that it will meet the needs of 'I' too.

**PS 5:**

- 1. a. Observe that any physical facility you use, follows the given sequence with time :  
Necessary & tasteful → unnecessary & tasteful → unnecessary & tasteless → intolerable
- b. In contrast, observe that any feeling in you is either naturally acceptable or not acceptable at all. If naturally acceptable, you want it continuously and if not acceptable, you do not want it any moment!

2. List down all your activities. Observe whether the activity is of 'I' or of Body or with the participation of both 'I' and Body.
3. Observe the activities within 'I'. Identify the object of your attention for different moments (over a period of say 5 to 10 minutes) and draw a line diagram connecting these points. Try to observe the link between any two nodes.

**Expected outcome:**

1. The students are able to see that all physical facilities they use are required for a limited time in a limited quantity. Also they are able to see that in case of feelings, they want continuity of the naturally acceptable feelings and they do not want feelings which are not naturally acceptable even for a single moment.
2. the students are able to see that activities like understanding, desire, thought and selection are the activities of 'I' only, the activities like breathing, palpitation of different parts of the body are fully the activities of the body with the acceptance of 'I' while the activities they do with their sense organs like hearing through ears, seeing through eyes, sensing through touch, tasting through tongue and smelling through nose or the activities they do with their work organs like hands, legs etc. are such activities that require the participation of both 'I' and body.
3. The students become aware of their activities of 'I' and start finding their focus of attention at different moments. Also they are able to see that most of their desires are coming from outside (through preconditioning or sensation) and are not based on their natural acceptance.

**PS 6:**

1. Chalk out programs to ensure that you are responsible to your body- for the nurturing, protection and right utilisation of the body.
2. Find out the plants and shrubs growing in and around your campus. Find out their use for curing different diseases.

**Expected outcome:** The students are able to list down activities related to proper upkeep of the body and practice them in their daily routine. They are also able to appreciate the plants wildly growing in and around the campus which can be beneficial in curing different diseases.

**UNIT 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship**

**PS 7:** Form small groups in the class and in that group initiate dialogue and ask the eight questions related to trust. The eight questions are :

- |  |   |
|--|---|
| 1a. Do I want to make myself happy?        | 1b. Am I able to make myself always happy?      |
| 2a. Do I want to make the other happy?     | 2b. Am I able to make the other always happy?   |
| 3a. Does the other want to make him happy? | 3b. Is the other able to make him always happy? |
| 4a. Does the other want to make me happy?  | 4b. Is the other able to make me always happy?  |

*What is the answer?*  
Intention (Natural Acceptance)

*What is the answer?*  
Competence

Let each student answer the questions for himself and everyone else. Discuss the difference between intention and competence. Observe whether you evaluate your intention & competence as well as the others' intention & competence.

**Expected outcome:** The students are able to see that the first four questions are related to our Natural Acceptance i.e. Intention and the next four to our Competence. They are able to note that the intention is always correct, only competence is lacking! We generally evaluate ourselves on the basis of our intention and others on the basis of their competence! We seldom look at our competence and others' intention as a result we conclude that I am a good person and other is a bad person.

**PS 8:**

1. Observe on how many occasions you are respecting your related ones (by doing the right evaluation) and on how many occasions you are disrespecting by way of under-evaluation, over-evaluation or otherwise evaluation.
2. Also observe whether your feeling of respect is based on treating the other as yourself or on differentiations based on body, physical facilities or beliefs.

**Expected outcome:** The students are able to see that respect is right evaluation, and only right evaluation leads to fulfillment in relationship. Many present problems in the society are an outcome of differentiation (lack of understanding of respect), like gender biasness, generation gap, caste conflicts, class struggle, dominations through power play, communal violence, clash of isms, and so on so forth. All these problems can be solved by realizing that the other is like me as he has the same natural acceptance, potential and program to ensure a happy and prosperous life for him and for others though he may have different body, physical facilities or beliefs.

**PS 9:**

1. Write a note in the form of story, poem, skit, essay, narration, dialogue to educate a child. Evaluate it in a group.
2. Develop three chapters to introduce 'social science- its need, scope and content' in the primary education of children

**Expected outcome:** The students are able to use their creativity for educating children. The students are able to see that they can play a role in providing value education for children. They are able to put in simple words the issues that are essential to understand for children and comprehensible to them. The students are able to develop an outline of holistic model for social science and compare it with the existing model.

**Module 4: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence**

**PS 10:** List down units (things) around you. Classify them in four orders. Observe and explain the mutual fulfillment of each unit with other orders.

**Expected outcome:** The students are able to differentiate between the characteristics and activities of different orders and study the mutual fulfillment among them. They are also able to see that human beings are not fulfilling to other orders today and need to take appropriate steps to ensure right participation (in terms of nurturing, protection and right utilization) in the nature.

**PS 11:**

1. Make a chart for the whole existence. List down different courses of studies and relate them to different units or levels in the existence.
2. Choose any one subject being taught today. Evaluate it and suggest suitable modifications to make it appropriate and holistic.

**Expected outcome:** The students feel confident that they can understand the whole existence; nothing is a mystery in this existence. They are also able to see the interconnectedness in the nature, and point out how different courses of study relate to the different units and levels. Also they are able to make out how these courses can be made appropriate and holistic.

**UNIT 5: Implications of the above Holistic Understanding of Harmony at all Levels of Existence**

**PS 12:** Choose any two current problems of different kind in the society and suggest how they can be solved on the basis of natural acceptance of human values. Suggest steps you will take in present conditions.

**Expected outcome:** The students are able to present sustainable solutions to the problems in society and nature. They are also able to see that these solutions are practicable and draw roadmaps to achieve them.

**PS 13:**

1. Suggest ways in which you can use your knowledge of Technology/Engineering/Management for universal human order, from your family to the world family.
2. Suggest one format of humanistic constitution at the level of nation from your side.

**Expected outcome:** The students are able to grasp the right utilization of their knowledge in their streams of Technology/Engineering/ Management to ensure mutually enriching and recyclable productions systems.

**PS 14:** The course is going to be over now. Evaluate your state before and after the course in terms of

- a. Thought    b. Behavior and    c. Work    d. Realization

Do you have any plan to participate in the transition of the society after graduating from the institute? Write a brief note on it.

**Expected outcome:** The students are able to sincerely evaluate the course and share with their friends. They are also able to suggest measures to make the course more effective and relevant. They are also able to make use of their understanding in the course for a happy and prosperous society.

## Reference Material

The primary resource material for teaching this course consists of

a. The text book

R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2

b. The teacher's manual

R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics – Teachers Manual, Excel books, New Delhi, 2010

c. A set of DVDs containing

- Video of Teachers' Orientation Program
- PPTs of Lectures and Practice Sessions
- Audio-visual material for use in the practice sessions

In addition, the following reference books may be found useful for supplementary reading in connection with different parts of the course:

1. B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.
2. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Publishers.
3. Sussan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *limits to Growth*, Club of Rome's Report, Universe Books.
6. Subhas Palekar, 2000, *How to practice Natural Farming*, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. A Nagraj, 1998, *Jeevan Vidya ek Parichay*, Divya Path Sansthan, Amarkantak.
8. E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
9. A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.

## Relevant websites, movies and documentaries

1. Value Education websites, <http://uhv.ac.in>, <http://www.uptu.ac.in>
2. Story of Stuff, <http://www.storyofstuff.com>
3. Al Gore, *An Inconvenient Truth*, Paramount Classics, USA
4. Charlie Chaplin, *Modern Times*, United Artists, USA
5. IIT Delhi, *Modern Technology – the Untold Story*
6. *Gandhi A., Right Here Right Now*, Cyclewala Productions

<b>Text books:</b>		
1. William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall, 4th edition, 2010.		
2. Michael T. Goodrich and Roberto Tamassia, Introduction to Computer Security, Addison Wesley, 2011.		
3. William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall, 4th edition, 2010.		
4. Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, Handbook of Applied Cryptography, CRC Press, 2001.		
<b>Mapped With :</b> <a href="https://ict.iitk.ac.in/product/computer-system-security/">https://ict.iitk.ac.in/product/computer-system-security/</a>		

<b>PYTHON PROGRAMMING</b>		
<b>Course Outcome ( CO)</b>		<b>Bloom's Knowledge Level (KL)</b>
<b>At the end of course , the student will be able to understand</b>		
CO 1	To read and write simple Python programs.	K <sub>1</sub> , K <sub>2</sub>
CO 2	To develop Python programs with conditionals and loops.	K <sub>2</sub> , K <sub>4</sub>
CO 3	To define Python functions and to use Python data structures -- lists, tuples, dictionaries	K <sub>3</sub>
CO 4	To do input/output with files in Python	K <sub>2</sub>
CO 5	To do searching ,sorting and merging in Python	K <sub>2</sub> , K <sub>4</sub>
<b>DETAILED SYLLABUS</b>		<b>3-1-0</b>
<b>Unit</b>	<b>Topic</b>	<b>Proposed Lecture</b>
<b>I</b>	<b>Introduction:</b> The Programming Cycle for Python , Python IDE, Interacting with Python Programs , Elements of Python, Type Conversion. <b>Basics:</b> Expressions, Assignment Statement, Arithmetic Operators, Operator Precedence, Boolean Expression.	<b>08</b>
<b>II</b>	<b>Conditionals:</b> Conditional statement in Python (if-else statement, its working and execution), Nested-if statement and Elif statement in Python, Expression Evaluation & Float Representation. <b>Loops:</b> Purpose and working of loops , While loop including its working, For Loop , Nested Loops , Break and Continue.	<b>08</b>
<b>III</b>	<b>Function:</b> Parts of A Function , Execution of A Function , Keyword and Default Arguments ,Scope Rules. <b>Strings :</b> Length of the string and perform Concatenation and Repeat operations in it. Indexing and Slicing of Strings. <b>Python Data Structure :</b> Tuples , Unpacking Sequences , Lists , Mutable Sequences , List Comprehension , Sets , Dictionaries <b>Higher Order Functions:</b> Treat functions as first class Objects , Lambda Expressions	<b>08</b>

<b>IV</b>	<p><b>Sieve of Eratosthenes:</b> generate prime numbers with the help of an algorithm given by the Greek Mathematician named Eratosthenes, whose algorithm is known as Sieve of Eratosthenes.</p> <p><b>File I/O :</b> File input and output operations in Python Programming</p> <p><b>Exceptions and Assertions</b></p> <p><b>Modules :</b> Introduction , Importing Modules ,</p> <p><b>Abstract Data Types :</b> Abstract data types and ADT interface in Python Programming.</p> <p><b>Classes :</b> Class definition and other operations in the classes , Special Methods ( such as <code>_init_</code>, <code>_str_</code>, comparison methods and Arithmetic methods etc.) , Class Example , Inheritance , Inheritance and OOP.</p>	<b>08</b>
<b>V</b>	<p><b>Iterators &amp; Recursion:</b> Recursive Fibonacci , Tower Of Hanoi</p> <p><b>Search :</b> Simple Search and Estimating Search Time , Binary Search and Estimating Binary Search Time</p> <p><b>Sorting &amp; Merging:</b> Selection Sort , Merge List , Merge Sort , Higher Order Sort</p>	<b>08</b>

**Text books:**

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist``, 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (<http://greenteapress.com/wp/thinkpython/>)
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. John V Guttag, —Introduction to Computation and Programming Using Python``, Revised and expanded Edition, MIT Press , 2013
4. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
5. Timothy A. Budd, —Exploring Python, Mc-Graw Hill Education (India) Private Ltd., 2015.
6. Kenneth A. Lambert, —Fundamentals of Python: First Programs, CENGAGE Learning, 2012.
7. Charles Dierbach, —Introduction to Computer Science using Python: A Computational ProblemSolving Focus, Wiley India Edition, 2013.
8. Paul Gries, Jennifer Campbell and Jason Montojo, —Practical Programming: An Introduction to Computer Science using Python 3, Second edition, Pragmatic Programmers, LLC, 2013.

**Mapped With :** <https://ict.iitk.ac.in/product/python-programming-a-practical-approach/>