

<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>		

## DETAILED SYLLABUS

<b>COMPUTER SYSTEM SECURITY</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>	To discover software bugs that pose cyber security threats and to explain how to fix the bugs to mitigate such threats	<b>K<sub>1</sub>, K<sub>2</sub></b>
<b>CO 2</b>	To discover cyber attack scenarios to web browsers and web servers and to explain how to mitigate such threats	<b>K<sub>2</sub></b>
<b>CO 3</b>	To discover and explain mobile software bugs posing cyber security threats, explain and recreate exploits, and to explain mitigation techniques.	<b>K<sub>3</sub></b>
<b>CO 4</b>	To articulate the urgent need for cyber security in critical computer systems, networks, and world wide web, and to explain various threat scenarios	<b>K<sub>4</sub></b>
<b>CO 5</b>	To articulate the well known cyber attack incidents, explain the attack scenarios, and explain mitigation techniques.	<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>	<b>Computer System Security Introduction:</b> Introduction, What is computer security and what to learn? , Sample Attacks, The Marketplace for vulnerabilities, Error 404 Hacking digital India part 1 chase. <b>Hijacking &amp; Defense:</b> Control Hijacking ,More Control Hijacking attacks integer overflow ,More Control Hijacking attacks format string vulnerabilities, Defense against Control Hijacking - Platform Defenses, Defense against Control Hijacking - Run-time Defenses, Advanced Control Hijacking attacks.	08
<b>II</b>	<b>Confidentiality Policies:</b> Confinement Principle ,Detour Unix user IDs process IDs and privileges , More on confinement techniques ,System call interposition ,Error 404 digital Hacking in India part 2 chase , VM based isolation ,Confinement principle ,Software fault isolation , Rootkits ,Intrusion Detection Systems	08
<b>III</b>	<b>Secure architecture principles isolation and leas:</b> Access Control Concepts , Unix and windows access control summary ,Other issues in access control ,Introduction to browser isolation . <b>Web security landscape :</b> Web security definitions goals and threat models , HTTP content rendering .Browser isolation .Security interface , Cookies frames and frame busting, Major web server threats ,Cross site request forgery ,Cross site scripting ,Defenses and protections against XSS , Finding vulnerabilities ,Secure development.	08
<b>IV</b>	<b>Basic cryptography:</b> Public key cryptography ,RSA public key crypto ,Digital signature Hash functions ,Public key distribution ,Real world protocols ,Basic terminologies ,Email security certificates ,Transport Layer security TLS ,IP security , DNS security.	08
<b>V</b>	<b>Internet Infrastructure:</b> Basic security problems , Routing security ,DNS revisited ,Summary of weaknesses of internet security ,.Link layer connectivity and TCP IP connectivity , Packet filtering firewall ,Intrusion detection.	08

**B.TECH. (COMPUTER SCIENCE AND ENGINEERING)  
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 Dijikstra 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, Yedidyah 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 etal, “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

Discrete Structures & Theory of Logic (KCS303)		
Course Outcome (CO)		Bloom's Knowledge Level (KL)
<b>At the end of course , the student will be able to understand</b>		
CO 1	Write an argument using logical notation and determine if the argument is or is not valid.	K <sub>3</sub> , K <sub>4</sub>
CO 2	Understand the basic principles of sets and operations in sets.	K <sub>1</sub> , K <sub>2</sub>
CO 3	Demonstrate an understanding of relations and functions and be able to determine their properties.	K <sub>3</sub>
CO 4	Demonstrate different traversal methods for trees and graphs.	K <sub>1</sub> , K <sub>4</sub>
CO 5	Model problems in Computer Science using graphs and trees.	K <sub>2</sub> , K <sub>6</sub>
<b>DETAILED SYLLABUS</b>		<b>3-0-0</b>
Unit	Topic	Proposed Lecture
<b>I</b>	<b>Set Theory:</b> Introduction, Combination of sets, Multisets, Ordered pairs. Proofs of some general identities on sets. <b>Relations:</b> Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Recursive definition of relation, Order of relations. <b>Functions:</b> Definition, Classification of functions, Operations on functions, Recursively defined functions. Growth of Functions. <b>Natural Numbers:</b> Introduction, Mathematical Induction, Variants of Induction, Induction with Nonzero Base cases. Proof Methods, Proof by counter – example, Proof by contradiction.	<b>08</b>
<b>II</b>	<b>Algebraic Structures:</b> Definition, Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Group Homomorphisms, Definition and elementary properties of Rings and Fields.	<b>08</b>
<b>III</b>	<b>Lattices:</b> Definition, Properties of lattices – Bounded, Complemented, Modular and Complete lattice. <b>Boolean Algebra:</b> 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.	<b>08</b>
<b>IV</b>	<b>Propositional Logic:</b> Proposition, well formed formula, Truth tables, Tautology, Satisfiability, Contradiction, Algebra of proposition, Theory of Inference. (8) <b>Predicate Logic:</b> First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic.	<b>08</b>
<b>V</b>	<b>Trees:</b> Definition, Binary tree, Binary tree traversal, Binary search tree. <b>Graphs:</b> Definition and terminology, Representation of graphs, Multigraphs, 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. <b>Combinatorics:</b> Introduction, Counting Techniques, Pigeonhole Principle	<b>08</b>
<b>Text books:</b>		
1.Koshy, Discrete Structures, Elsevier Pub. 2008 Kenneth H. Rosen, Discrete Mathematics and Its Applications, 6/e, McGraw-Hill, 2006.		
2. B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, 5/e, Prentice Hall, 2004.		
3.E.R. Scheinerman, Mathematics: A Discrete Introduction, Brooks/Cole, 2000.		
4.R.P. Grimaldi, Discrete and Combinatorial Mathematics, 5/e, Addison Wesley, 2004		
5.Liptschutz, Seymour, “ Discrete Mathematics”, McGraw Hill.		
6.Trembley, J.P & R. Manohar, “Discrete Mathematical Structure with Application to Computer Science”, McGraw Hill.		
4. Deo, 7.Narsingh, “Graph Theory With application to Engineering and Computer.Science.”, PHI.		
8. Krishnamurthy, V., “Combinatorics Theory & Application”, East-West Press Pvt. Ltd., New Delhi		

## SENSOR AND INSTRUMENTATION

**Pre-requisites of course:** Basic Electrical Engineering

<b>Course Outcomes:</b>		<b>Knowledge Level, KL</b>
Upon the completion of the course, the student will be able to:		
<b>CO 1</b>	Apply the use of sensors for measurement of displacement, force and pressure.	K <sub>3</sub>
<b>CO2</b>	Employ commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level.	K <sub>3</sub>
<b>CO3</b>	Demonstrate the use of virtual instrumentation in automation industries.	K <sub>2</sub>
<b>CO4</b>	Identify and use data acquisition methods.	K <sub>3</sub>
<b>CO5</b>	Comprehend intelligent instrumentation in industrial automation.	K <sub>2</sub>

### **Detailed Syllabus:**

#### **Unit- I:**

Sensors & Transducer: Definition, Classification & selection of sensors, Measurement of displacement using Potentiometer, LVDT & Optical Encoder, Measurement of force using strain gauge, Measurement of pressure using LVDT based diaphragm & piezoelectric sensor.

#### **Unit-II:**

Measurement of temperature using Thermistor, Thermocouple & RTD, Concept of thermal imaging, Measurement of position using Hall effect sensors, Proximity sensors: Inductive & Capacitive, Use of proximity sensor as accelerometer and vibration sensor, Flow Sensors: Ultrasonic & Laser, Level Sensors: Ultrasonic & Capacitive.

#### **Unit -III:**

Virtual Instrumentation: Graphical programming techniques, Data types, Advantage of Virtual Instrumentation techniques, Concept of WHILE & FOR loops, Arrays, Clusters & graphs, Structures: Case, Sequence & Formula nodes, Need of software based instruments for industrial automation.

#### **Unit-IV:**

Data Acquisition Methods: Basic block diagram, Analog and Digital IO, Counters, Timers, Types of ADC: successive approximation and sigma-delta, Types of DAC: Weighted Resistor and R-2R Ladder type, Use of Data Sockets for Networked Communication.

#### **Unit V:**

Intelligent Sensors: General Structure of smart sensors & its components, Characteristic of smart sensors: Self calibration, Self-testing & self-communicating, Application of smart sensors: Automatic robot control & automobile engine control.

**Text Books:**

1. DVS Murthy, Transducers and Instrumentation, PHI 2nd Edition 2013
2. D Patranabis, Sensors and Transducers, PHI 2nd Edition 2013.
3. S. Gupta, J.P. Gupta / PC interfacing for Data Acquisition & Process Control, 2nd ED / Instrument Society of America, 1994.
4. Gary Johnson / Lab VIEW Graphical Programming II Edition / McGraw Hill 1997.

**Reference Books:**

1. Arun K. Ghosh, Introduction to measurements and Instrumentation, PHI, 4th Edition 2012.
2. A.D. Helfrick and W.D. cooper, Modern Electronic Instrumentation & Measurement Techniques, PHI – 2001
3. Hermann K.P. Neubert, “Instrument Transducers” 2nd Edition 2012, Oxford University Press.

# **Technical Communication**

## **(KAS301/401)**

### **(Effective from the session 2019-20)**

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#### **Unit -1 Fundamentals of Technical Communication:**

Technical Communication: Features; Distinction between General and Technical Communication; Language as a tool of Communication; Dimensions of Communication: Reading & comprehension; Technical writing: sentences; Paragraph; Technical style: Definition, types & Methods; The flow of Communication: Downward; upward, Lateral or Horizontal; Barriers to Communication.

#### **Unit - II Forms of Technical Communication:**

Technical Report: Definition & importance; Thesis/Project writing: structure & importance; synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar & Conference paper writing; Expert Technical Lecture: Theme clarity; Analysis & Findings; 7 Cs of effective business writing: concreteness, completeness, clarity, conciseness, courtesy, correctness, consideration, C.V./Resume writing; Technical Proposal: Types, Structure & Draft.

#### **Unit - III Technical Presentation: Strategies & Techniques**

Presentation: Forms; interpersonal Communication; Class room presentation; style; method; Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance; emotion; Humour; Modes of Presentation; Overcoming Stage Fear; Audience Analysis & retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; Audience Participation: Quizzes & Interjections.

#### **Unit - IV Technical Communication Skills:**

Interview skills; Group Discussion: Objective & Method; Seminar/Conferences Presentation skills: Focus; Content; Style; Argumentation skills: Devices: Analysis; Cohesion & Emphasis; Critical thinking; Nuances: Exposition narration & Description; effective business communication competence: Grammatical; Discourse competence: combination of expression & conclusion; Socio-linguistic competence: Strategic competence: Solution of communication problems with verbal and non verbal means.

#### **Unit - V Dimensions of Oral Communication & Voice Dynamics:**

Code and Content; Stimulus & Response; Encoding process; Decoding process; Pronunciation Etiquette; Syllables; Vowel sounds; Consonant sounds; Tone: Rising tone; Falling Tone; Flow in Speaking; Speaking with a purpose; Speech & personality; Professional Personality Attributes: Empathy; Considerateness; Leadership; Competence.

#### **Reference Books**

1. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi.
2. Personality Development and Soft Skills by Barun K. Mitra, OUP, 2012, New Delhi.
3. Spoken English- A Manual of Speech and Phonetics by R.K.Bansal & J.B.Harrison, Orient Blackswan, 2013, New Delhi.
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Practical Communication: Process and Practice by L.U.B. Pandey; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2014, Delhi.



6. Modern Technical Writing by Sherman, Theodore A (et.al); Apprentice Hall; New Jersey; U.S.
7. A Text Book of Scientific and Technical Writing by S.D. Sharma; Vikas Publication, Delhi.
8. Skills for Effective Business Communication by Michael Murphy, Harvard University, U.S.
9. Business Communication for Managers by Payal Mehra, Pearson Publication, Delhi.

## **Course Outcomes**

1. Students will be enabled to **understand** the nature and objective of Technical Communication relevant for the work place as Engineers.
2. Students will **utilize** the technical writing for the purposes of Technical Communication and its exposure in various dimensions.
3. Students would imbibe inputs by presentation skills to **enhance** confidence in face of diverse audience.
4. Technical communication skills will **create** a vast know-how of the application of the learning to promote their technical competence.
5. It would enable them to **evaluate** their efficacy as fluent & efficient communicators by learning the voice-dynamics.