## DETAILED SYLLABUS

| COMPUTER SYSTEM SECURITY | | |
|---|---|---|
| **Course Outcome ( CO)** | | **Bloom's Knowledge Level (KL)** |
| **At the end of course , the student will be able to understand** | | |
| **CO 1** | To discover software bugs that pose cyber security threats and to explain how to fix the bugs to mitigate such threats | **$K_1$, $K_2$** |
| **CO 2** | To discover cyber attack scenarios to web browsers and web servers and to explain how to mitigate such threats | **$K_2$** |
| **CO 3** | To discover and explain mobile software bugs posing cyber security threats, explain and recreate exploits, and to explain mitigation techniques. | **$K_3$** |
| **CO 4** | To articulate the urgent need for cyber security in critical computer systems, networks, and world wide web, and to explain various threat scenarios | **$K_4$** |
| **CO 5** | To articulate the well known cyber attack incidents, explain the attack scenarios, and explain mitigation techniques. | **$K_5$, $K_6$** |
| **DETAILED SYLLABUS** | | **3-1-0** |

| Unit | Topic | Proposed Lecture |
|---|---|---|
| **I** | **Computer System Security Introduction**: Introduction, What is computer security and what to l earn? , Sample Attacks, The Marketplace for vulnerabilities, Error 404 Hacking digital India part 1 chase.<br>**Hijacking & Defense:** 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 |
| **II** | **Confidentiality Policies:** 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 |
| **III** | **Secure architecture principles isolation and leas:** Access Control Concepts , Unix and windows access control summary ,Other issues in access control ,Introduction to browser isolation .<br>**Web security landscape :** 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 |
| **IV** | **Basic cryptography:** 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 |
| **V** | **Internet Infrastructure:** 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 |

# Mathematics –III
# (Integral Transform & Discrete Maths)

## (To be offered to CE and Allied Branches CE/EV)

| | | | | | | |
|---|---|---|---|---|---|---|
| Subject Code | KAS303/KAS403 | | | | | |
| Category | Basic Science Course | | | | | |
| Subject Name | MATHEMATICS-III (Integral Transform & Discrete Maths) | | | | | |
| Scheme and Credits | **L-T-P** | **Theory Marks** | **Sessional** | | **Total** | **Credit** |
| | | | **Test** | **Assig/Att.** | | |
| | 3—1—0 | 100 | 30 | 20 | 150 | 4 |
| Pre- requisites (if any) | Knowledge of Mathematics I and II of B. Tech or equivalent | | | | | |

**Course Outcomes**

The objective of this course is to familiarize the students with Laplace Transform, Fourier Transform, their application, logic group, sets, lattices, Boolean algebra and Karnaugh maps. It aims to present the students with standard concepts and tools at B.Tech first year to superior level that will provide them well towards undertaking a variety of problems in the concern discipline.

The students will learn:

- The idea of Laplace transform of functions and their application
- The idea of Fourier transform of functions and their applications
- The basic ideas of logic and Group and uses.
- The idea s of sets, relation, function and counting techniques.
- The idea of lattices, Boolean algebra, Tables and Karnaugh maps.

**Laplace Transform** **(8)**

Laplace transform, Existence theorem, Laplace transforms of derivatives and integrals, Initial and final value theorems, Unit step function, Dirac- delta function, Laplace transform of periodic function, Inverse Laplace transform, Convolution theorem, Application to solve simple linear and simultaneous differential equations.

**MODULE II**

**Integral Transforms** **(9)**

Fourier integral, Fourier Transform , Complex Fourier transform, Inverse Transforms, Convolution Theorems, Fourier sine and cosine transform, Applications of Fourier transform to simple one dimensional heat transfer equations, wave equations and Laplace equations, Z-Transform and its application to solve difference equations.

**Module- III** (**8**)

**Formal Logic ,Group, Ring and Field:** Introduction to First order logic, Proposition, Algebra of Proposition, Logical connectives, Tautologies, contradictions and contingency, Logical implication, Argument, Normal form, Rules of inferences, semi group, Monoid Group, Group, Cosets, Lagrange's theorem , Congruence relation , Cyclic and permutation groups, Properties of groups, Rings and Fields (definition, examples and standard results only)

**Module- IV** (**10**)

**Set, Relation, function and Counting Techniques** - Introduction of Sets, Relation and Function, Methods of Proof, Mathematical Induction, Strong Mathematical Induction, Discrete numeric function and Generating functions, recurrence relations and their solution , Pigeonhole principle.

**Module- V** (**10**)

**Lattices and Boolean Algebra**: Introduction, Partially ordered sets, Hasse Diagram, Maximal and Minimal element, Upper and Lower bounds, Isomorphic ordered sets, Lattices, Bounded Lattices and , Distributive Lattices.

Duality, Boolean Algebras as Lattices, Minimization of Boolean Expressions, prime Implicants, Logic Gates and Circuits, Truth Table, Boolean Functions, Karnaugh Maps.

Text Books


1. E. Kreyszig: Advanced Engineering Mathematics; John Wiley & Sons.
2. R.K. Jain & S.R.K. Iyenger: Adnanced Engineering Mathematics, Narosa Publishing House.
3. C.L.Liu: Elements of Discrete Mathematics; Tata McGraw- Hill Publishing Company Limited, New Delhi.
4. S. Lipschutz, M.L. Lipson and Varsha H. Patil: Discrete Mathematics; Tata McGraw-Hill Publishing Company Limited, New Delhi
5. B. Kolman , Robert C. Busby & S. C. Ross: Discrete Mathematical Structures' $5^{th}$ Edition, Perason Education ( Singapore), Delhi, India.


Reference Books


1. B.S. Grewal: Higher Engineering Mathematics; Khanna Publishers, New Delhi.
2. B.V. Ramana: Higher Engineering Mathematics; Tata McGraw- Hill Publishing Company Limited, New Delhi.
3. Peter V.O' Neil. Advanced Engineering Mathematics, Thomas ( Cengage) Learning.
4. Kenneth H. Rosem: Discrete Mathematics its Application, with Combinatorics and Graph Theory; Tata McGraw- Hill Publishing Company Limited, New Delhi
5. K.D. Joshi: Foundation of Discrete Mathematics; New Age International (P) Limited, Publisher, New Delhi.

## COURSE OUTCOMES

| | Course Outcome (CO) | Bloom's Knowledge Level (KL) |
|---|---|---|
| | At the end of this course, the students will be able to: | |
| CO 1 | Remember the concept of Laplace transform and apply in solving real life problems. | $K_1$ & $K_3$ |
| CO 2 | Understand the concept of Fourier and Z – transform to evaluate engineering problems | $K_2$ & $K_4$ |
| CO 3 | Remember the concept of Formal Logic ,Group and Rings to evaluate real life problems | $K_1$ & $K_5$ |
| CO 4 | Apply the concept of Set, Relation, function and Counting Techniques | $K_3$ |
| CO 5 | Apply the concept of Lattices and Boolean Algebra to create Logic Gates and Circuits, Truth Table, Boolean Functions, Karnaugh Maps | $K_3$ & $K_6$ |

$K_1$ – Remember, $K_2$ – Understand, $K_3$ – Apply, $K_4$ – Analyze, $K_5$ – Evaluate, $K_6$ – Create

**Evaluation methodology to be followed:**

The evaluation and assessment plan consists of the following components:

a. Class attendance and participation in class discussions etc.
b. Quiz.
c. Tutorials and assignments.
d. Sessional examination.
e. Final examination.

**Award of Internal/External Marks:**

Assessment procedure will be as follows:

1. These will be comprehensive examinations held on-campus (Sessionals).
2. Quiz.
   a. Quiz will be of type multiple choice, fill-in-the-blanks or match the columns.
   b. Quiz will be held periodically.
3. Tutorials and assignments
   a. The assignments/home-work may be of multiple choice type or comprehensive type at least one assignment from each Module/Unit.
   b. The grades and detailed solutions of assignments (of both types) will be accessible online after the submission deadline.
4. Final examinations.
   These will be comprehensive external examinations held on-campus or off campus (External examination) on dates fixed by the Dr. APJ Abdul Kalam Technical University, Lucknow.

| Microprocessor (KCS403) | | |
|---|---|---|
| **Course Outcome ( CO)** | | **Bloom's Knowledge Level (KL)** |
| **At the end of course , the student will be able to understand** | | |
| CO 1 | Apply a basic concept of digital fundamentals to Microprocessor based personal computer system. | $K_3$, $K_4$ |
| CO 2 | Analyze a detailed s/w & h/w structure of the Microprocessor. | $K_2$,$K_4$ |
| CO 3 | Illustrate how the different peripherals (8085/8086) are interfaced with Microprocessor. | $K_3$ |
| CO 4 | Analyze the properties of Microprocessors(8085/8086) | $K_4$ |
| CO 5 | Evaluate the data transfer information through serial & parallel ports. | $K_5$ |

| **DETAILED SYLLABUS** | | **3-1-0** |
|---|---|---|
| **Unit** | **Topic** | **Proposed Lecture** |
| **I** | Microprocessor evolution and types, microprocessor architecture and operation of its components, addressing modes, interrupts, data transfer schemes, instruction and data flow, timer and timing diagram, Interfacing devices. | **08** |
| **II** | Pin diagram and internal architecture of 8085 microprocessor, registers, ALU, Control & status, interrupt and machine cycle. Instruction sets. Addressing modes. Instruction formats Instruction Classification: data transfer, arithmetic operations, logical operations, branching operations, machine control and assembler directives. | **08** |
| **III** | Architecture of 8086 microprocessor: register organization, bus interface unit, execution unit, memory addressing, and memory segmentation. Operating modes. Instruction sets, instruction format, Types of instructions. Interrupts: hardware and software interrupts. | **08** |
| **IV** | Assembly language programming based on intel 8085/8086. Instructions, data transfer, arithmetic, logic, branch operations, looping, counting, indexing, programming techniques, counters and time delays, stacks and subroutines, conditional call and return instructions | **08** |
| **V** | Peripheral Devices: 8237 DMA Controller, 8255 programmable peripheral interface, 8253/8254programmable timer/counter, 8259 programmable interrupt controller, 8251 USART and RS232C. | **08** |

**Text books:**


1. Gaonkar, Ramesh S , "Microprocessor Architecture, Programming and Applications with
2. 8085", Penram International Publishing.
3. Ray A K , Bhurchandi K M , "Advanced Microprocessors and Peripherals", TMH
4. Hall D V ,"Microprocessor Interfacing', TMH
5. Liu and, " Introduction to Microprocessor", TMH
6. Brey, Barry B, "INTEL Microprocessors", PHI
7. Renu Sigh & B.P. Gibson G A , " Microcomputer System: The 8086/8088 family'' ,PHI
8. Aditya P Mathur Sigh, "Microprocessor, Interfacing and Applications M Rafiqzzaman, "Microprocessors, Theory and Applications
9. J.L. Antonakos, An Introduction to the Intel Family of Microprocessors, Pearson, 1999

## B.TECH. (COMPUTER SCIENCE AND ENGINEERING)

## FOURTH SEMESTER (DETAILED SYLLABUS)

| Operating systems (KCS401) | | |
|---|---|---|
| **Course Outcome ( CO)** | | **Bloom's Knowledge Level (KL)** |
| **At the end of course , the student will be able to understand** | | |
| CO 1 | Understand the structure and functions of OS | $K_1$, $K_2$ |
| CO 2 | Learn about Processes, Threads and Scheduling algorithms. | $K_1$, $K_2$ |
| CO 3 | Understand the principles of concurrency and Deadlocks | $K_2$ |
| CO 4 | Learn various memory management scheme | $K_2$ |
| CO 5 | Study I/O management and File systems. | $K_2$,$K_4$ |
| **DETAILED SYLLABUS** | | **3-0-0** |

| Unit | Topic | Proposed Lecture |
|---|---|---|
| I | **Introduction** : Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multiprocess Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems. | 08 |
| II | **Concurrent Processes**: Process Concept, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication models and Schemes, Process generation. | 08 |
| III | **CPU Scheduling:** Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock. | 08 |
| IV | **Memory Management:** Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference. | 08 |
| V | **I/O Management and Disk Scheduling**: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system protection and security. | 08 |

**Text books:**


1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
2. Sibsankar Halder and Alex A Aravind, "Operating Systems", Pearson Education
3. Harvey M Dietel, " An Introduction to Operating System", Pearson Education
4. D M Dhamdhere, "Operating Systems : A Concept based Approach", 2nd Edition,
5. TMH 5. William Stallings, "Operating Systems: Internals and Design Principles ", 6th Edition, Pearson Education

# Technical Communication
# (KAS301/401)
# (Effective from the session 2019-20)

**L T P**
**2 1 0**

**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, Harward 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.

| Theory of Automata and Formal Languages (KCS402) | | |
|---|---|---|
| **Course Outcome ( CO)** | | **Bloom's Knowledge Level (KL)** |
| **At the end of course , the student will be able to understand** | | |
| CO 1 | Analyse and design finite automata, pushdown automata, Turing machines, formal languages, and grammars | $K_4$, $K_6$ |
| CO 2 | Analyse and design, Turing machines, formal languages, and grammars | $K_4$, $K_6$ |
| CO 3 | Demonstrate the understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving | $K_1$, $K_5$ |
| CO 4 | Prove the basic results of the Theory of Computation. | $K_2$,$K_3$ |
| CO 5 | State and explain the relevance of the Church-Turing thesis. | $K_1$, $K_5$ |

| **DETAILED SYLLABUS** | | **3-1-0** |
|---|---|---|
| **Unit** | **Topic** | **Proposed Lecture** |
| **I** | **Basic Concepts and Automata Theory:** Introduction to Theory of Computation- Automata, Computability and Complexity, Alphabet, Symbol, String, Formal Languages, Deterministic Finite Automaton (DFA)- Definition, Representation, Acceptability of a String and Language, Non Deterministic Finite Automaton (NFA), Equivalence of DFA and NFA, NFA with ε-Transition, Equivalence of NFA's with and without ε-Transition, Finite Automata with output- Moore Machine, Mealy Machine, Equivalence of Moore and Mealy Machine, Minimization of Finite Automata, Myhill-Nerode Theorem, Simulation of DFA and NFA | **08** |
| **II** | **Regular Expressions and Languages:** Regular Expressions, Transition Graph, Kleen's Theorem, Finite Automata and Regular Expression- Arden's theorem, Algebraic Method Using Arden's Theorem, Regular and Non-Regular Languages- Closure properties of Regular Languages, Pigeonhole Principle, Pumping Lemma, Application of Pumping Lemma, Decidability- Decision properties, Finite Automata and Regular Languages, Regular Languages and Computers, Simulation of Transition Graph and Regular language. | **08** |
| **III** | **Regular and Non-Regular Grammars**: Context Free Grammar(CFG)-Definition, Derivations, Languages, Derivation Trees and Ambiguity, Regular Grammars-Right Linear and Left Linear grammars, Conversion of FA into CFG and Regular grammar into FA, Simplification of CFG, Normal Forms- Chomsky Normal Form(CNF), Greibach Normal Form (GNF), Chomsky Hierarchy, Programming problems based on the properties of CFGs. | **08** |
| **IV** | **Push Down Automata and Properties of Context Free Languages**: Nondeterministic Pushdown Automata (NPDA)- Definition, Moves, A Language Accepted by NPDA, Deterministic Pushdown Automata(DPDA) and Deterministic Context free Languages(DCFL), Pushdown Automata for Context Free Languages, Context Free grammars for Pushdown Automata, Two stack Pushdown Automata, Pumping Lemma for CFL, Closure properties of CFL, Decision Problems of CFL, Programming problems based on the properties of CFLs. | **08** |
| **V** | **Turing Machines and Recursive Function Theory** : Basic Turing Machine Model, Representation of Turing Machines, Language Acceptability of Turing Machines, Techniques for Turing Machine Construction, Modifications of Turing Machine, Turing Machine as Computer of Integer Functions, Universal Turing machine, Linear Bounded Automata, Church's Thesis, Recursive and Recursively Enumerable language, Halting Problem, Post's Correspondance Problem, Introduction to Recursive Function Theory. | **08** |

**Text books:**


1. Introduction to Automata theory, Languages and Computation, J.E.Hopcraft, R.Motwani, and Ullman. 2nd edition, Pearson Education Asia
2. Introduction to languages and the theory of computation, J Martin, 3rd Edition, Tata McGraw Hill
3. Elements and Theory of Computation, C Papadimitrou and C. L. Lewis, PHI
4. Mathematical Foundation of Computer Science, Y.N.Singh, New Age Internationa