FOUR YEAR DEGREE COURSE IN
COMPUTER SCIENCE & ENGINEERING
FIFTH SEMESTER (CREDIT & GRADE SYSTEM)

5KS01/ 5KE01 DATA COMMUNICATION

Unit I: Introduction: Components, Networks, Protocols and standards, Basic Concepts: Line Configuration, Topology Transmission mode, analog and digital signals, periodic and aperiodic signals, analog signals, time and frequency domains, composite signals, digital signals. **08Hrs**

Unit II: Encoding and modulating: digital –to- digital conversion, analog-to-digital conversion, digital to analog conversion, analog to analog conversion, digital data transmission, DTE-DCE interface, modems, cable modems. Transmission media: guided media, unguided media, and transmission impairment. Performance, wavelength, Shannon capacity, media comparison. **8Hrs**

Unit III : Multiplexing: Many to one/ one to many, frequency division multiplexing, wave division multiplexing, TDM, multiplexing applications: the telephone system , Error detection and correction : types of errors, detection , VRC, Longitudinal redundancy check, cyclic redundancy check, checksum, error correction. **08Hrs**

Unit IV : Data link Control: Line Discipline, flow control, error control, Data link Protocols: Asynchronous Protocols, synchronous protocols, character oriented protocols, bit - oriented protocols, link access procedures. **08Hrs**

Unit V : Local Area Networks: Ethernet, other Ethernet networks, token bus, token ring, FDDI, Comparison, IEEE802.6 (DQDB) SMDS, Switching: circuit switching, packet switching, message switching, integrated services digital networks (ISDN): services, history, subscriber access to ISDN. **08Hrs**

Unit VI: Frame relay: introduction, frame relay operation, frame relay layers, congestion control, leaky bucket algorithm, traffic control, and other features. **08Hrs**

Text Book:
Behrouz A. Forouzan: Data Communication and Networking, (2/e) (TMH)

Reference Books:
1. William Stallings: Data & Computer Communications, 6/e, Pearson Education.
2. William L. Schweber : Data Communication, McGraw Hill.
3. J.Freey : Computer Communication & Networks, AEW Press.
4. D. Corner : Computer Networks & Internet, Pearson Education.

5KS02 /5KE02 FILE STRUCTURES & DATA PROCESSING

UNIT I: Introduction: File structure design, File processing operations : open, close, read, write, seek. Unix directory structure. Secondary storage devices: disks, tapes, CD-ROM. Buffer management. I/O in Unix. **08 Hrs**

UNIT II: File Structure Concepts: Field & record organization, Using classes to manipulate buffers, Record access, Record structures, file access & file organization, Abstract data models for file access. Metadata. Extensibility, Portability & standardization. **08 Hrs**

UNIT III: Data Compression, Reclaiming spaces in files, Introduction to internal sorting and Binary searching. Keysorting. Indexing concepts. Object I/O. Multiple keys indexing. Inverted lists, Selective indexes, Binding. **08 Hrs**

UNIT IV : Cosequential processing : Object-Oriented model, its application. Internal sorting: a second look. File Merging : Sorting of large files on disks. Sorting files on tapes. Sort merge packages. Sorting and Cosequential processing in Unix. **08 Hrs**

UNIT V: Multilevel indexing : Indexing using Binary Search trees. OOP based B-trees. B-tree methods Search, Insert and others. Deletion, merging & redistribution. B*trees. Virtual B-trees. VL records & keys. Indexed sequential file access and Prefix B+trees. **08 Hrs**

UNIT VI: Hashing : Introduction, a simple hashing algorithm. Hashing functions and record distributions. Collision resolution. Buckets. Making deletions. Pattern of record access. External hashing. Implementation. Deletion. Performance. Alternative approaches. **08 Hrs**

Text Book: Michael J.Folk, Bill Zoellick, Greg Riccard :File Structures : An Object-Oriented Approach using C++. (Addison-Wesley) (LPE)

Reference Books:
1. M, Loomis: "Data Management & File Processing" (PHI)
2. O.Hanson: "Design of Computer Data Files" McGraw-Hill (IE)
3. D. E. Knuth: " The Art of Computer Programming", Volume 3, (Addison Wesley).
4. James Bradly: " Files and Database Techniques", (Mc Graw Hill).

5KS03 /5KE03 SYSTEM SOFTWARE

Unit I : Introduction to Compiling: Phases of a compiler, Lexical Analysis: The role of lexical analyzer, input buffering, specification of tokens, recognition of tokens, and language for specifying lexical analysis, lex and yacc tools, state minimization of DFA. **08 Hrs**

Unit II : Syntax Analysis: The role of the parser, Review of context free grammar for syntax analysis. Top down parsing: recursive descent parsing, predictive parsers, Transition diagrams for predictive parsers, Non recursive predictive parsing, FIRST and FOLLOW, Construction of predictive parsing tables, LL (1) grammars. Error recovery in predictive parsing. **08 Hrs**

Unit III: Bottom up parsing: Handle pruning, Stack implementation of Shift Reduce Parsing, conflicts during shift reduce parsing, LR parsers: LR parsing algorithm, Construction of SLR parsing table, canonical LR parsing tables and canonical LALR parsing tables. Error recovery in LR parsing. **08 Hrs**

Unit IV: Syntax Directed Translation: Syntax directed definitions, attributes, dependency graphs, construction of syntax trees. Syntax directed definition for constructing syntax trees, directed acyclic graphs for expressions. Bottom up evaluation of s-attributed definitions, L-attributed definition. Top down translation, Design of a predictive translator. **08 Hrs**

Unit V : Run Time Environments: Source language issues: Activation trees, control stacks, storage organization, subdivision of run time memory, activation records, Storage allocation strategies, static allocation, stack allocation, dangling references. Symbol table: Entries, Storage allocation, Hash tables, Scope information. **08 Hrs**

Unit VI: Code Generation: Intermediate languages, Translation of Declarations & Assignments statements. Design issues of a Code generator, Target machine, Runtime storage management, Basic blocks and flow graphs. **08 Hrs**

Text Book:
A V Aho, R Sethi, J D Ullman "Compilers Principles, Techniques and Tools", Pearson Education (LPE).

Reference Books:
1. D. M. Dhamdhere, Compiler Construction—Principles and Practice, (2/e), Macmillan India

2. Andrew Appel, Modern Compiler Implementation in C, Cambridge University press

3. K C. Louden "Compiler Construction—Principles and Practice" India Edition, CENGAGE

4. Bennett J.P., "Introduction to Compiling Techniques", 2/e (TMH).

5KS04 /5KE04 SWITCHING THEORY AND LOGIC DESIGN

Unit I : VHDL Modeling Concepts, VHDL Fundamentals: Constants, Variables, Scalar types, Type Classification, Expressions, Operators, Sequential Statements, If, Case, Null, Loop, Assertion, Reports statements. **08 Hrs**

Unit II : Array & VHDL, Unconstrained array types, Array operations & referencing, Records Basic Modeling constructs: Entity declarations, Architecture bodies, Behavioral descriptions, Structural descriptions, Design processing, Sub Programs and Procedures. **08 Hrs**

Unit III : Minimization of Switching Function: Review of Karnaugh-map up to four variables, Limitation of K-Maps, Implementation of Logic Functions, Nondegenerate Forms, Quine – McCluskey Method. **08 Hrs**

Unit IV : Combinational Logic Design: Introduction, Design Procedure, Adders, Subtractors, Binary Parellel Adder, 4-bit Parallel Subtractor, Binary Adder-Subtractor, The Look-ahead-carry Adder, 2's Complement Addition and subtraction Using Parallel Adders. **08 Hrs**

Unit V : Serial Adder, BCD Adder, Excess-3 Adder and Subtractor, Binary Multipliers, Code Converters, Parity Bit Generators/Checkers, Comparators, IC Comparator, Encoders, Keyboard Encoders, Decoders, Multiplexers. **08 Hrs**

Unit VI : Sequential Circuits Design: Conversion of Flip-Flops, Design of Synchronous, Asynchronous Counters and Shift Register Counters. Finite State Machine, Mathematical Representation of Synchronous Sequential machine, Mealy and Moore Model. **08 Hrs**

Text Book:
1. Peter J. Ashenden, "The Designer's Guide to VHDL", 2nd Edn, Harcourt Asia
2. Anand Kumar "Switching Theory and Logic Design" (PHI)

Reference Books:
1. J.F. Wakerly, "Digital Logic Design", PHI.
2. V.P. Nelson Et al, "Digital Logic Circuits, Analysis & Design", PHI.
3. Moris Mano & Kime."Logic and Computer Design Fundamentals" Pearson Education.
4. J. Bhaskar, "VHDL Primer", Person Education

FREE ELECTIVE-I
5FEKS05 (i) DATA STRUCTURES & ALGORITHMS

Unit I : Data structures basics, Mathematical /algorithmic notations & functions, Complexity of algorithms, Sub-algorithms. String processing: storing strings, character data type, string operations, word processing, and pattern matching algorithms.
08Hrs.

Unit-II : Linear arrays and their representation in memory, traversing linear arrays, inserting & deleting operations, Bubble sort, Linear search and Binary search algorithms. Multi-demensional arrays, Pointer arrays. Record structures and their memory representation. Matrices and sparse matrices. **08Hrs.**

Unit-III: Linked lists and their representation in memory, traversing a linked list, searching a linked list. Memory allocation & garbage collection. Insertion deletion operations on linked lists. Header linked lists, Two- way linked lists. **08Hrs.**

Unit-IV: Stacks and their array representation. Arithmetic expressions: Polish notation. Quick sort, application of stacks. Implementation of recursive procedures by stacks, Queues. Deques. Priority queues. **08Hrs.**

Unit-V : Trees, Binary trees & and their representation in memory, Traversing binary trees. Traversal algorithms using stacks, Header nodes : threads. Heap and heapsort. Path length & Huffman's algorithm. General trees. **08Hrs.**

Unit-VI : Graph theory, sequential representations of graphs, Warshalls' algorithm, Linked representation, operations & traversing the graphs. Posets & Topological sorting. Insertion Sort, Selection Sort. Radix sort. **8Hrs.**

Text Book:
Seymour Lipschutz: "Data Structures with C", Schaum's Outline Series.

Reference Books:

1. Forouzan, Gilberg: Data Structures and Algorithms, CENGAGE Learning.

2. Reema Thareja: Data Structures using C, Oxford University Press, 2011.

3. Arpita Gopal: Magnifying Data structures, PHI (EEE), 2010.

4. Ellis Horowitz, Sartaj Sahni: Fundamentals of Data Structures, CBS Publications.

FREE ELECTIVE-I
5FEKS05 (ii) DATA COMMUNICATION AND NETWORKING

Unit I : Introduction: Components, Networks, Protocols and standards, Basic Concepts: Line Configuration, Topology, Transmission mode, analog and digital signals, periodic and aperiodic signals, analog signals, time and frequency domains, composite signals, digital signals.

Unit II : Encoding and modulating: digital –to- digital conversion, analog-to-digital conversion, digital to analog conversion, analog to analog conversion, digital data transmission, DTE-DCE interface, modems, cable modems, transmission media: guided media, unguided media, transmission impairment.

Unit III : Multiplexing: Many to one/ one to many, frequency division multiplexing, wave division multiplexing, TDM, multiplexing applications: the telephone system , Error detection and correction : types of errors, detection , cyclic redundancy check, checksum, error correction.

Unit IV: Data link Control: Line Discipline, flow control, error control, Data link Protocols: Asynchronous Protocols, synchronous protocols, character oriented protocols, bit - oriented protocols.

Unit V : Local Area Networks: Ethernet, other Ethernet networks, token bus, token ring, FDDI, Comparison, MAN: IEEE802.6 (DQDB) SMDS, Switching: circuit switching, packet switching, message switching.

UNIT VI: Networking and Internetworking Devices: Repeaters, Bridges, Routers, Gateways. Transport Layer: Functions of transport layer, connection, the OSI transport protocol, upper OSI Layer: Session layer, presentation layer, Application Layer.

Text Book:
Behrouz A. Forouzan: Data Communication and Networking, (2/e), TMH.

Reference Books:

1. William Stallings: Data & Computer Communications, (6/e) Pearson Education.

2. William L. Schweber : Data Communication, McGraw Hill.

3. J.Freey : Computer Communication & Networks, AEW Press.

4. D. Comer : Computer Networks & Internet, Pearson Education.

5KS06 / 5KE06   COMMUNICATION SKILLS

Unit I: Introduction to Communication: Introduction- Importance of Communication, Basics of Communication, Purpose and Audience, Cross-cultural Communication, Language As a tool of communication, Communicative Skills-LSRW, Effective Communication, Modes of Communication, Importance of Technical Communication, Barriers to Communication: Introduction, Classification of Barriers, Information Gap Principle-Given and New Information, Filters, Basics of Technical Communication: Introduction, Objective and Characteristics of Technical Communication, Process of Communication, Levels of Communication, Flow of Communication, Communication Networks, Visual Aids in Technical Communication

Unit II : Active Listening: Introduction, Reason for poor Listening, Traits of a Good Listener, Listening Modes, Types of Listening, Barriers to Effective Listening, Listening for General Content and Specific Information, Effective Speaking: Introduction, Achieving Confidence, Clarity, and Fluency, Paralinguistic Features, Barriers to Speaking, Types of Speaking, Persuasive Speaking, Public Speaking, Listening and Speaking: Introduction, Conversations, Telephonic Conversations and Etiquette, Dialogue Writing, Effective Presentation Strategies: Introduction, Planning, Outlining and Structuring, Nuances of Delivery, Controlling Nervousness and Stage Fright, Visual Aids in Presentations, Application of Ms PowerPoint, Interviews: Introduction, Objectives of Interviews, Types of Interviews, Job Interviews, Media Interviews, Press Conferences, Group Communication: Introduction, Forms of Group Communication, Use of Body Language in Group Communication, Discussions.

Unit III : Reading: Introduction, Reading Rates, Reading and Interpretation, Intensive and Extensive Reading, Critical Reading, Reading for different Purposes, Reading Comprehension, Reading Techniques: Introduction, Improving Comprehension Skills, Techniques for Good Comprehension, General Kitchen Layout, Predicting the Content, Understanding the Gist, SQ3R Reading technique, Study Skills, Technical Writing: Introduction, Audience Recognition/Analysis, Language, Elements of Style, Techniques for Good Technical Writing, Reports: Introduction, Characteristics of a Report, Categories of Reports, Formats, Prewriting, Structure of Reports (Manuscripts format), Types of Report, Technical Proposals:

Introduction, Definition and Purpose, Types, Characteristics, Structure of Proposals, Style and Appearance, Evaluation of Proposals, Research Paper, Dissertation, Thesis.

Text Book:
Raman & Sharma: "Technical Communication Principles & Practice" (2/e) Oxford University Press.

Reference Books:
1. M Ashraf Rizvi: " Effective Technical Communication" Mc Graw Hill.
2. Mohan, Banerjee: "Developing Communication Skills",MacMillan India Limited.
3. ChrissieWright(Editor): "Handbook of Practical Communication Skills", Jaico Publishing House.
4. CDC, TTTI WR, Bhopal: "A Course in Technical English, Somaiya Publication Pvt. Ltd."
5. F.Frank Candlin: "General English for Technical Students", University of London Press Ltd.

5KS07 System Software Lab.: Minimum Eight experiments/ programming assignments must be completed based on the respective syllabus uniformly covering each of the units.

5KS08 Switching Theory & Logic Design Lab.: Minimum Eight experiments/programming assignments must be completed based on the respective syllabus covering each of the units. Design Practical examples should be based on Unit III to Unit VI using VHDL.

5KS09 Communication Skills Lab.: Minimum Eight experiments/ programming assignments must be completed based on the respective syllabus as follows.

On completion of this laboratory the candidate should be able to demonstrate adequate skills in oral and written communication for technical English language actively participate in group discussions and interviews and exhibit the evidence of vocabulary building. Candidates should be assessed through continuous monitoring and evaluation. The sample list of experiments is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.
1. Assignments and tests for vocabulary building, Phonetics.
2. Technical report writing
3. Group discussions
4. Interview techniques
5. Projects and tasks such as class news letter
6. Writing daily diaries and letters
7. Interactive language laboratory experiments.

Reference Book: Norman Lewis: Word Power Made Easy
Website: http://www.teachingenglish.org.uk

6KS01/ 6KE01   OPERATING SYSTEMS

Unit-I : Introduction: Operating System(OS) definition, OS Evolution, OS Components, OS Services, Process Concept, Process Scheduling, Operations on Processes, Cooperating Processes, Inter-process Communication, Threads: Multithreading Models, Threading Issues, Java Threads.

Unit-II: CPU Scheduling: Concepts, Scheduling Criteria, Scheduling Algorithms, Process Synchronization: The Critical Section Problem, Synchronization Hardware, Semaphores, Monitors. Deadlocks: Definition & Characterization, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.   **08 Hrs**

Unit-III: Memory Management: Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with Paging. Virtual Memory: Background, Demand Paging, Process Creation, Page Replacement, Allocation of Frames, Thrashing.   **08 Hrs**

Unit-IV: File-System Interface: Directory Structure, File-System Mounting, File Sharing, Protection. File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, File Recovery.   **08 Hrs**

Unit-V : I/O Systems: Overview, I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O to Hardware Operations. Disk Scheduling, Disk Management, Swap-Space Management, RAID Structure.   **08 Hrs**

Unit-VI: The Linux System: History, Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File systems, Input and Output, Inter process Communication, Network Structure & Security in Linux.   **08Hrs**

Text Book:
Avi Silberschatz ,P.B.Galvin, G.Gagne: "Operating System Concepts" (6/e) John-Wiley & Sons.
Reference Books:
1.   A.S Tanenbaum "Modern Operating Systems" Pearson Education.
2.   William Stallings "Operating Systems" Prentice-Hall.
3.   D M Dhamdhere "Operating Systems" Tata McGraw-Hill.
4.   P.Balkrishna Prasad: "Operating Systems" Scitech Pubications(I) Pvt. Ltd.

6KS02 / 6KE02   DATABASE SYSTEMS

Unit-I : Database System Applications, Database Systems versus File Systems, View of Data, Data Models, Database Languages, Database Users and Administrators, Transaction Management, Database System Structure, Application architectures, History of Database Systems. Entity- Relationship Model, Basic Concepts, Constraints, Keys, Design Issues, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R Features, Design of an E-R Database Schema, Reduction of an E-R Schema to Tables.   **08Hrs**

Unit-II: Relational Model: Structure of Relational Databases, The Relational Algebra, Extended Relational-Algebra Operations, Modification of the Database, Views, The Tuple Relational Calculus, The Domain Relational Calculus, SQL: Basic Structure, Set Operations, Aggregate Functions, Null Values, Nested Subqueries, Views.   **08Hrs**

Unit-III: Integrity and Security, Domain Constraints, Referential Integrity, Assertions, Triggers, Security and Authorization, Authorization in SQL, Encryption and Authentication, Relational-Database Design:, First Normal Form, Pitfalls in Relational-Database, Design, Functional Dependencies, Decomposition, BCNF, Third, Fourth and more Normal Forms, Overall Database Design Process.   **08 Hrs**

Unit-IV: Query Processing: Overview, Measures of Query Cost, Selection Operation, Sorting, Join Operation, Other Operations, Evaluation of Expressions, Query Optimization: Overview, Estimating Statistics of Expression Results, Transformation of Relational Expressions, Choice of Evaluation Plans, Materialized Views.   **08Hrs**

Unit-V : Transaction Management: Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Execution, Serializability, Recoverability, Implementation of Isolation, Transaction Definition in SQL, Testing for Serializability.   **08Hrs**

Unit-VI: Concurrency Control: Lock-Based Protocols, Timestamp-Based Protocols, Validation-Based Protocols, Multiple Granularities, Multi-version Schemes, Deadlock Handling, Insert and Delete Operations Weak Levels of Consistency, Concurrency in Index Structures. Recovery System: issues & solutions.   **08Hrs**

Text Book:

Silberschatz, Korth, Sudarshan: "Database System Concepts" , (5th Edition)McGraw Hill,

Reference Books:

1. Garcia-Molina, Ullman, Widom: Database System Implementation, Pearson education.
2. S. K. Singh: Database Systems, Concepts, Design and Applications, Pearson Education.
3. G.K. Gupta: Database Management Systems, McGraw Hill.
4. Toledo and Cushman: Database Management Systems, (Schaum's Outlines)

6KS03 / 6KE03   COMPUTING RESOURCES MANAGEMENT

Unit-I : Systems Management: Definition, Building a Business Case for Systems Management, Organizing for Systems Management, Factors to Consider in Designing IT Organizations and Infrastructure. Staffing for Systems Management, IT as Service, and IT Service Management.

Unit-II : Availability, Methods for Measuring Availability, Seven ' Rs' of High Availability. Performance and Tuning, Definition and characteristics. Performance and Tuning Applied to the Five Major Resource Environments. Problem Management: Definition and scope. Key Steps to Developing a Problem Management Process.

Unit-III : Storage Management: Definition, Desired Traits, Capacity, Performance, Reliability, Recoverability.Network Management: Definition, Key Decisions about Network Management, Assessing, Measuring and Streamlining an Infrastructure's Network Management Process.

Unit-IV : Configuration Management, Definition, Practical Tips for Improving Configuration Management. Capacity Planning: Definition, reasons for poor Capacity Planning, Developing an Effective Capacity Planning Process, Benefits and hints for effective capacity planning.

Unit-V : Strategic Security: Definition, Developing a Strategic Security Process, Assessing, Measuring and Streamlining the Security Process. Facilities Management: Definition, Major Elements, Tips, Assessing, Measuring and Streamlining the Facilities Management Process.

Unit-VI: Developing Robust Processes: Features of World-Class Infrastructure. Characteristics of a Robust Process. Integrating Systems Management Processes. Client-Server Environment Issues. Web-Enabled Environment Issues.

Text Book:

Ritch Schiesser "IT Systems Management", 2nd Edition, Prentice Hall.

Reference Books :

1. Bill Holtsnider, Brian Jaffe, Brian D Jaffe "IT Managers Handbook" (2/e) Morgan Kaufmann.
2. Jan Van Bon,et.el.,"Foundation of IT Service Management Based on ITIL V3" Van Haren.
3. Harrise Kern, Rich Schiesser " IT Systems Management", 1st Edition, Prentice Hall.

6KS04 / 6KE04 COMPUTER ARCHITECTURE

Unit I : Instruction Sets: Machine Instruction Characteristics, Types of Operands, Intel x86 and ARM Data Types, Types of Operations, Intel x86 and ARM Operation Types.
08 Hrs

Unit II: Instruction Sets: Addressing, x86 and ARM Addressing modes, Instruction Formats, x86 and ARM Instruction Formats, Assembly language.   **08Hrs**

Unit III : Processor Structure and Function: Processor Organization, Register Organization, The Instruction Cycle, Instruction Pipelining, The x86 Processor Family, The ARM Processor.
08 Hrs

Unit IV: Reduced Instruction Set Computers (RISCs): Instruction Execution Characteristics, The Use of Large Register File, Compiler-Based Register Optimization, RISC Architecture, RISC Pipelining. RISC versus CISC.   **08 Hrs**

Unit V : Control Unit Operation: Micro-operations, Control of the Processor, Hardwired Implementation, Microprogrammed control, Basic Concepts, Microinstruction Sequencing & Execution.   **08Hrs**

Unit VI : Parallel Processing: The Use of Multiple Processors, Symmetric Multiprocessors, Multithreading and Chip Multiprocessors, Clusters, Multicore Organization, Intel x 86 Multi-Core Organization.   **08 Hrs**

Text Book:

William Stallings: "Computer Organization and Architecture", (8/e) Pearson Education.

Reference Books:

1. Behrooz Parhami: "Computer Architecture", Oxford University Press.

2. J.P. Hayes: "Computer Architecture and Organization" ,McGraw Hill.

3. D.A. Patterson, J.L. Hennessy: "Computer Architecture" Morgan Kauffmann, 2002.

4. Hwang and Briggs: "Computer Architecture and Parallel Processing" McGraw-Hill.

6FEKS05 FREE ELECTIVE-II
(i) DATABASE MANAGEMENT SYSTEMS

Unit-I : Introduction: Database System Applications, Purpose of Database Systems, and View of Data, Database Languages, Database Architecture, Database Users and Administrators. Relational Model: Structure of Relational Databases, Fundamentals of Relational-Algebra.

Unit-II : SQL: Background, Data Definition, Basic Structure of SQL queries, Set Operations, Aggregate Functions, Null Values, Nested Sub queries, Complex Queries, Views, Modification of Database, Joined relations. SQL Data Types and Schemas, Integrity Constraints, Authorization.

Unit-III: Database Design: Overview of the Design Process, Entity-Relationship Model, Constraints, Entity-Relationship Diagrams, Reduction to Relational Schemas. Relational Database Design: Atomic Domains, Normalization and Normal Forms, Functional Dependencies, Decomposition using Functional Dependencies.

Unit-IV : Query Processing: Overview, Measures of Query Cost, Selection Operation, Sorting, Join Operation, Other Operations, Evaluation of Expressions. Query Optimization: Overview, Transformation of Relational Expressions, Materialized Views.

Unit-V : Transaction Management: Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Execution, Serializability, Recoverability, Testing for Serializability.

Unit-VI : Concurrency Control: Lock-Based Protocols, Timestamp-Based Protocols, Validation-Based Protocols, Multiple Granularity, Weak Levels of Consistency, Recovery System: Failure Classification, Recovery and Atomicity, Log-Based Recovery.

Text Book :
Silberschatz, Korth, Sudarshan: "Database System Concepts", (5/e) McGraw Hill.

Reference Books:

1. Raghu Ramkrishnan, Johannes Gherke: Database Management Systems, TMH.

2. C.J.Date: Introduction to Database Systems, Pearson Education.

3. Connolly & Begg: Database System, Low Price Ed.

4. El-Maseri, Navathe: Fundamentals of Database Systems, Pearson Education.

6FEKS05 FREE ELECTIVE-II
(ii) SOFTWARE PROJECT MANAGEMENT

Unit I: Evolving role of Software. Software crises & myths. Software engineering. Software process & process models: Linear sequential, prototyping, RAD, Evolutionary Product & Process. Project management concepts: People, Product, Process, Project. WSHH principle, critical practice.

Unit II : Measures, Metrics & Indicators. Metrics in process & project domains-software measurement, Metrics for software quality, small organization. Software projects Planning: Scope, resources, estimation, decomposition technique, Tools. Software risks : identification, risk projection, refinement & RMMM plan.

Unit III: Project Scheduling: Concepts. Peoples Efforts. Task set, Task network. Scheduling. EV analysis, Project Plan. Software quality concepts. SQ Assurance, Software reviews, technical reviews, software reliability, ISO 900 L, SQA Plan. SCM process. Version control. SCM standard.

Unit IV : System engineering: Hierarchy, Business Process & Product engineering: Overviews. Requirement engineering, System modeling. Requirement analysis. Analysis principles. Software prototyping. Specification. Design Process. Design Principles & Concepts. Effective modular design. Design model & documentation.

Unit V: Software architecture, Data Design, Architectural styles, Requirement mapping. Transform & Transaction mappings. User-interface design : Golden Rule. UTD, Task analysis & modeling, ID activities, Tools, design evaluation. Component level design : Structure programming, Comparison of design notation.

Unit VI: Software testing fundamentals; test case design, Whitebox testing. Basis path, control structure-, Blackbox-Testing, & for specialized environments. Strategic approach to S/W testing. Unit testing, integration testing, validation testing, system testing. Debugging. Technical metrics for software.

Textbook:
Pressman Roger. S: "Software Engineering, A Practitioner's Approach", TMH.

Reference Books :

1. Somerville: Software Engineering (Addison-Wesley) (5/e)

2. Davis A: Principles of Software Development (McGraw Hill)

3. Jawadekar W.S.: Software Engineering Principles and Practice, Mc Graw Hill.

4. Jalote Pankaj: An Integrated Approach to Software Engineering, Narosa Publications.

6KS06 / 6KE06 PROFESSIONAL ETHICS

Unit I : Introduction: Computers in a Social Context. Moral and Legal Issues. Computer Ethical Issues. Philosophical Ethics: Descriptive and Normative Claims, Ethical Relativism, Utilitarianism, Deontological Theories, Rights, Virtue Ethics, Individual and Social Policy Ethics. Professional Ethics: Characteristics and system of Professions, Computing as Profession, Professional Relationships, Conflicting Responsibilities, Code of Ethics and Professional Conduct, Collective Responsibility.   **08 Hrs**

Unit II : Ethics and The Internet: Three Morally Significant Characteristics, Hacking and Hacker Ethics, New Species of Old Crime, Netiquette, And Policy Approaches. Computers and Privacy issues, Legislative Background, Global Perspective, Proposals for Better Privacy Protection. Property Rights in Computer Software: Definitions, Current Legal Protection, Philosophical basis and analysis of Property, Proprietary Software, and Software Copying.   **08 Hrs**

Unit III : Accountability, Computer and Information Technology: Different Senses of Responsibility, Buying and Selling Software, Y2K Problem, Diffusion of Accountability, Internet Issues, ISP Liability, and Virtual Action. Technology and Social change, Embedded Values, Enhanced and Impeded Values, Democratic Values in the Internet, Internet as Democratic Technology, Access and the Digital Divide, Free Expression, Overarching and Future Issues.   **08Hrs**

Text Book:
Deborah G. Johnson: "Computer Ethics" Pearson Education (Third Edition).

Reference Books:
1. George Reynolds: "Ethics in Information Technology" Cengage Learning.
2. Hester and Ford: "Computers and Ethics in the Cyberage.
3. Duncan Langford: "Internet Ethics"
4. Richard A. Spinello: "Case Studies in Information Technology Ethics" PHI.

6KS07 Operating Systems Lab.: Minimum Eight experiments/programming assignments must be completed based on the respective syllabus uniformly covering each of the units.

6KS08 Database Systems Lab.: Minimum Eight experiments/programming assignments must be completed based on the respective syllabus uniformly covering each of the units along with one mini project.

6KS09 Computer Lab-II (Hardware Lab): This lab is based on PC organization, troubleshooting & maintenance.
Student should perform practical on the following areas of PC:
1. PC models.
2. Inside the PC.
3. Preventive maintenance.
4. PC troubleshooting.
5. Semiconductor memories
6. Power supplies & power protection
7. Hard Disks: installing, configuring & maintenance
8. SCSI drives
9. Printers & their troubleshooting
10. Modems & serial interfaces, USB's and Devices.
11. Keyboard, Mice, Video adapters & displays
12. Sound boards, Video capture & CD ROMs.
13. Study of PC Ports & Interfacing Cards.

Books :
1. Mark Minasi : Complete PC upgrade & Maintenance Guide (BPB)
2. Scott Muller: Upgrading and Repairing PCs 12/e (Que)