Unit–1: Architecture And Machines: Some definition and terms, interpretation and microprogramming. The instruction set, Basic data types, Instructions, Addressing and Memory. Virtual to real mapping, Basic Instruction Timing.

Unit–2: Time, Area And Instruction Sets: Time, cost-area, technology state of the Art, The Economics of a processor project: A study, Instruction sets, Professor Evaluation Matrix

Unit–3: Cache Memory Notion: Basic Notion, Cache Organization, Cache Data, adjusting the data for cache organization, write policies, strategies for line replacement at miss time, Cache Environment, other types of Cache. Split I and D-Caches, on chip caches, Two level Caches, write assembly Cache, Cache references per instruction, technology dependent Cache considerations, virtual to real translation, overlapping the Tcycle in V-R Translation, studies. Design summary.

Unit–4: Memory System Design: The physical memory, models of simple processor memory interaction, processor memory modeling using queuing theory, open, closed and mixed-queue models, waiting time, performance, and buffer size, review and selection of queueing models, processors with cache.


Shared Memory Multiprocessors: Basic issues, partitioning, synchronization and coherency, Type of shared Memory multiprocessors, Memory Coherence in shared Memory Multiprocessors.

Text Book:
• Advance computer architecture by Hwang & Briggs, 1993, TMH.

Reference Books:
• Pipelined and Parallel processor design by Michael J. Fyinn – 1995, Narosa.

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.
CSE-403 E  
Software Project Management

L  T  P  
3  1  -  

Class Work: 50  
Exam: 100  
Total: 150  
Duration of Exam: 3 Hrs.

Unit-1: **Introduction to Software Project Management (SPM):** Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, categorizing SPs, project as a system, management control, requirement specification, information and control in organization.

Unit-2: **Stepwise Project planning:** Introduction, selecting a project, identifying project scope and objectives, identifying project infrastructure, analyzing project characteristics, identifying project products and activities, estimate efforts each activity, identifying activity risk, allocate resources, review/publicize plan.

Unit-3: **Project Evaluation & Estimation:** Cost benefit analysis, cash flow forecasting, cost benefit evaluation techniques, risk evaluation. Selection of an appropriate project report; Choosing technologies, choice of process model, structured methods, rapid application development, waterfall-, V-process-, spiral- models. Prototyping, delivery. Albrecht function point analysis.

Unit-4: **Activity planning & Risk Management:** Objectives of activity planning, project schedule, projects and activities, sequencing and scheduling activities, network planning model, representation of lagged activities, adding the time dimension, backward and forward pass, identifying critical path, activity throat, shortening project, precedence networks.

Risk Management: Introduction, the nature of risk, managing risk, risk identification, risk analysis, reducing the risks, evaluating risks to the schedule, calculating the z values.

Unit-5: **Resource allocation & Monitoring the control:** Introduction, the nature of resources, identifying resource requirements, scheduling resources creating critical paths, counting the cost, being specific, publishing the resource schedule, cost schedules, the scheduling sequence.

Monitoring the control: Introduction, creating the framework, collecting the data, visualizing progress, cost monitoring, earned value, prioritizing monitoring, getting the project back to target, change control.

Unit-6: **Managing contracts and people:** Introduction, types of contract, stages in contract, placement, typical terms of a contract, contract management, acceptance, Managing people and organizing terms: Introduction, understanding behavior, organizational behavior: a back ground, selecting the right person for the job, instruction in the best methods, motivation, working in groups, becoming a team, decision making, leadership, organizational structures, conclusion, further exercises.

Unit-7: **Software quality:** Introduction, the place of software quality in project planning, the importance of software quality, defining software quality, ISO 9126, Practical software quality measures, product versus process quality management, external standards, techniques to help enhance software quality.

Unit-8: **Study of Any Software Project Management software:** viz Project 2000 or equivalent

**Text Book:**
- Software Project Management (2nd Edition), by Bob Hughes and Mike Cotterell, 1999, TMH

**Reference Books:**
- Software Engineering – A Practitioner’s approach, Roger S. Pressman (5th edi), 2001, MGH
- Project Management 2/c. Maylor
- Managing Global software Projects, Ramesh, 2001, TMH.

**Note:** Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.
Unit–1:  Introduction To Compilers: Compilers and translators, need of translators, structure of compiler :its different phases, Compiler construction tools.

Unit–2: Lexical Analysis: Role of lexical analyzer, design of lexical analyzer, regular expressions , Specification and recognition of tokens, input buffering, A language specifying lexical analyzer. Finite automata, conversion from regular expression to finite automata, and vice versa, minimizing number of states of DFA, Implementation of lexical analyzer.

Unit–3: Syntax Analysis: Role of parsers, context free grammars, definition of parsing.

Unit–4: Parsing Technique: Shift- reduce parsing, operator precedence parsing, top down parsing, predictive parsing.

Unit–5: LR parsers, SLR, LALR and Canonical LR parser.

Unit–6: Syntax Directed Translations: Syntax directed definition, construction of syntax trees, syntax directed translation scheme, implementation of syntax directed translation, three address code, quadruples and triples.

Unit–7: Symbol Table & Error Detection And Recovery: Symbol tables, its contents and data structure for symbol tables; trees, arrays, linked lists, hash tables. Errors, lexical phase error, syntactic phase error, semantic error.

Unit–8: Code Optimization & Code Generation: Code generation, forms of objects code, machine dependent code, optimization, register allocation for temporary and user defined variables.

Text Books:

Reference Books:
- System software by Dhamdae, 1986, MGH.
- Principles of compiler Design, Narosa Publication

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.
1. Practice of LEX/YACC of compiler writing.

2. Write a program to check whether a string belong to the grammar or not.

3. Write a program to generate a parse tree.

4. Write a program to find leading terminals.

5. Write a program to find trailing terminals.

6. Write a program to compute FIRST of non-terminal.

7. Write a program to compute FOLLOW of non-terminal.

8. Write a program to check whether a grammar is left Recursion and remove left Recursion.

9. Write a program to remove left factoring.

10. Write a program to check whether a grammar is operator precedent.

11. To show all the operations of a stack.

12. To show various operations i.e. red, write and modify in a text file.

Note: At least 10 programs are required to be developed in the semester.
Study of Visual Basic 6.0.NET and Visual C++ 6.0.NET.

1) Study Windows API’s. Find out their relationship with MFC classes. Appreciate how they are helpful in finding complexities of windows programming.

2) Get familiar with essential classes in a typical (Document- view architecture) VC++ Program and their relationship with each other.

3) Create an SDI application in VC++ that adds a popup menu to your application which uses File drop down menu attached with the menu bar as the pop-up menu. The pop-up menu should be displayed on the right click of the mouse.

4) Create an SDI application in VC++ using which the user can draw atmost 20 rectangles in the client area. All the rectangles that are drawn should remain visible on the screen even if the window is refreshed. Rectangle should be drawn on the second click of the left mouse button out of the two consecutive clicks. If the user tries to draw more than 20 rectangles, a message should get displayed in the client area that “No more rectangles can be drawn”.

5) Create an application in VC++ that shows how menu items can be grayed, disabled and appended at run time.

6) Write a program in VC++ to implement serialization of inbuilt and user defined objects.

7) Write a program in VC++ to create archive class object from CFile class that reads and stores a simple structure (record).

8) Make an Active X control in VC++ derived from a standard control.

9) Write a program in VB to implement a simple calculator.

10) Create a simple database in MS Access Database /Oracle and a simple database application in VB that shows database connectivity through DAO and ADO.

11) Write a simple program that displays an appropriate message when the illegal operation is performed using error handling technique in VB.

12) Write a program in VB to create a notepad.

13) Create a DLL in VB.

Bright students may do the following exercises:

14) Write a program in VC++ to implement a simple calculator.

15) Write a program in VC++ to create a static link library and a dynamic link library.

16) Create a simple database in MS Access Database and a simple database application in VC++ that shows database connectivity through ADO model.

17) Make an Active X control of your own using VB.

18) With the help of VB, create an object of excel application and implement any action on it.
Unit-1: **Overview of biological neurons:** Structure of biological neurons relevant to ANNs.

Unit-2: **Fundamental concepts of Artificial Neural Networks:** Models of ANNs; Feedforward & feedback networks; learning rules; Hebbian learning rule, perception learning rule, delta learning rule, Widrow-Hoff learning rule, correction learning rule, Winner—take all learning rule, etc.

Unit-3: **Single layer Perception Classifier:** Classification model, Features & Decision regions; training & classification using discrete perceptron, algorithm, single layer continuous perceptron networks for linearly separable classifications.

Unit-4: **Multi-layer Feed forward Networks:** linearly non-separable pattern classification, Delta learning rule for multi-perceptron layer, Generalized delta learning rule, Error back-propagation training, learning factors, Examples.

Unit-5: **Single layer feed back Networks:** Basic Concepts, Hopfield networks, Training & Examples.

Unit-6: **Associative memories:** Linear Association, Basic Concepts of recurrent Auto associative memory: retrieval algorithm, storage algorithm; By directional associative memory, Architecture, Association encoding & decoding, Stability.

Unit-7: **Self organizing networks:** UN supervised learning of clusters, winner-take-all learning, recall mode, Initialisation of weights, separability limitations

**Text Books:**

**Reference Books:**
- “Neural Networks”, Kosko, 1992, PHI.
- “Neural Network Fundamentals” – N.K. Bose, P. Liang, 2002, T.M.H

**Note:** Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.
Semester-8

CSE-402 E  Distributed Operating System

L  T  P  Class Work:  50
3  1  –

Exam:  100
Total:  150
Duration of Exam:  3 Hrs.


Unit-2: Synchronization in Distributed System: Clock synchronization, Mutual Exclusion, Election algorithm, the Bully algorithm, a Ring algorithm, Atomic Transactions, Deadlock in Distributed Systems, Distributed Deadlock Prevention, Distributed Deadlock Detection.

Unit-3: Processes and Processors in distributed systems: Threads, System models, Processors Allocation, Scheduling in Distributed System, Real Time Distributed Systems.

Unit-4: Distributed file systems: Distributed file system Design, Distributed file system Implementation, Trends in Distributed file systems.

Distributed Shared Memory: What is shared memory, Consistency models, Page based distributed shared memory, shared variables distributed shared memory.

Unit-5: Case study MACH: Introduction to MACH, process management in MACH, communication in MACH, UNIX emulation in MACH.

Text Book:

• Distributed Operating System – Andrew S. Tanenbaum, PHI.

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.
UNIT 1: CORE JAVA
Introduction to Java, Data types, variables, operators, Arrays, Control Statements, Classes & Methods, Inheritance, Exception Handling, Multithreading, Collections, I/O streams, AVVT & Apolet Programming.

UNIT 2: NETWORKING
Connecting to a Server, Implementing Servers, Sending E-Mail, Making URL Connections, Advanced Socket Programming

UNIT 3: DATABASE NETWORKING
The Design of JDBC. The Structured Query Language, JDBC Installation, Basic JDBC Programming Concepts, Query Execution, Scrollable and Updatable Result Sets, Metadata, Row Sets, Transactions, Advanced Connection Management, Introduction of LDAP

UNIT 4: DISTRIBUTED OBJECTS
The Roles of Client and Server, Remote Method Invocations, Setup for Remote Method Invocation, Parameter Passing in Remote Methods Server Object Activation, Java IDL and CCRA, Remote Method Calls with SOAP

UNIT 5: SWING
Lists, Trees, Tables, Styled Text Components, Progress Indicators, Component Organizers

UNIT 6: AWT
The Rendering Pipeline, Shapes, Areas, Strokes, Paint, Coordinate Transformations, Clipping, Transparency and Composition, Rendering Hints, Readers and Writers for Images, Image Manipulation, Printing, The Clipboard, Drag and Drop

UNIT 7: JAVABEANS COMPONENTS
Beans, The Bean-Writing Process, Using Beans to Build an Application, Naming Patterns for Bean Components and Events, Bean Property Tubes, Beaninfo Classes, Property Editors

UNIT 8: SECURITY
Class Loaders, Bytecode Verification, Security Managers and Permissions, Digital Signatures, Code Signing, Encryption
TEXT BOOK:
Core Java™ 2, Volume II-Advanced Features, 7th Edition by Cay Horetmann, Gary Cornell
Pearson Publisher, 2004

REFERENCE BOOKS:
1. Professional Java Programming by Brett Spell, WROX Publication

Note: Eight questions are to be set – at lease one from each unit Students have to attempt any five.
Development of programs relating to:

- JDBC
- Servlets
- Beans
- RMI
- JSP
<table>
<thead>
<tr>
<th>Course Code</th>
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<tr>
<td>IT-464 E</td>
<td>Network Security &amp; Management</td>
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<tr>
<td>CSE-432 E</td>
<td>Digital Image Processing</td>
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<tr>
<td>CSE-434 E</td>
<td>Advanced Database Management Systems</td>
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<td>CSE-442 E</td>
<td>Human Computer Interaction</td>
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<td>CSE-444 E</td>
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<td>CSE-446 E</td>
<td>Natural Language Processing</td>
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<tr>
<td>CSE-448 E</td>
<td>Object Oriented Software Engineering</td>
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</table>
Unit-1: **Introduction:** Codes and Ciphers – Some Classical systems – Statistical theory of cipher systems-Complexity theory of crypto systems – Stream ciphers, Block ciphers.


Unit-3: **System Identification and clustering:** Cryptology of speech signals – narrow band and wide band systems – Analogue & Digital Systems of speech encryption.


Unit-5: Telecommunication Network Architecture, TMN management layers, Management information Model, Management servicing and functions, Structure of management information and TMN information model, SNMP v1, SNMP2 & SNMP3, RMON1 & 2, Broadband Network Management (ATM, HFC, DSL), ASN

Text Books:
- Network Management Principles & Practices by Subramanian, Mani (AWL)
- SNMP, Stalling, Willian (AWL)

Reference Books:
- SNMP: A Guide to Network Management (MGH)
- Telecom Network Management by H.H. Wang (MGH)
- Network Management by U. Dlack (MGH)

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.


Unit-4: Color Image Processing: Color Fundamentals, Color models, Basis of full color image processing, Color transformations.


Unit-6: Image Segmentation: Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation.

Unit-7: Representation, Description and Recognition: Representation-chain codes, polygonal approximation and skeletons, Boundary descriptors-simple descriptors, shape numbers, Regional descriptors- simple, topological descriptors, Pattern and Pattern classes-Recognition based on matching techniques.

Unit-8: Recognition: Pattern and pattern Classes, Decision-Theoretic Methods.

Text Book:

Reference Book:
- Digital Image Processing by A.K. Jain, 1995,-PHI

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.
Unit-1: **Data Models**: EER model and relationship to the OO model, Object Oriented data model and ODMG standard, Other data models - NIAM, GOOD, ORM.


**Distributed Databases**: Reliability and Commit protocols, Fragmentation and Distribution, View Integration, Distributed database design, Distributed algorithms for data management, Heterogeneous and Federated Database Systems.

Unit-3: **Deductive Databases**: Recursive Queries, Prolog/Datalog Notation, Basic inference Mechanism for Logic Programs, Deductive Database Systems, Deductive Object Oriented Database Systems.

**Commercial and Research Prototypes**: Parallel database, Multimedia database, Mobile database, Digital libraries, Temporal database.

**Text Book**:  

**Reference Book**:  

**Note**: Eight questions will be set in all by the examiners taking at least two questions from each unit. Students will be required to attempt five questions in all.
Unit 1: Introductions & overview of HCI:

- History of computer user interfaces, HCI - history and intellectual root

Human information processing limitations, human decision making:

1. Human cognitive and sensory limits
2. Human memory
3. Human problem solving
4. Skill acquisition
5. Users’ conceptual models (mental models)
6. Decision making

Unit 2: Computer systems and user interfaces, human-system interaction:

- Input and output devices, Mechanics of particular devices, Speech input, sound and speech output, Computer architecture, Performance characteristics of humans and systems, Color issues, Computer graphics, Color representation, color maps, color range of devices

Unit 3: Interaction models and metaphors:

- Use of abstract metaphors for describing interface behavior, Use of metaphors to support user understanding, Dialog input and output techniques and purposes, Screen layout issues, Dialog interaction: types and techniques, navigation and orientation, multimedia and non-graphical dialogues, Dialog issues: response time, control, standards, look and feel, Layers model of architecture of design and windowing systems, Windows manager models, e.g., X, Macintosh, MS Windows, Hypermedia and WWW

Unit 4: Principles guiding well-designed human-system interaction:

- Paradigms for interaction, Principles to support usability, Accounting for users with disabilities

Unit 5: The design process – overview:

- The typical software development lifecycle (idealized vs. actual), User-centered design overview, “Three pillars of design”, Usability engineering overview, Reconciling UCD and usability testing

Unit 6: The design process - task and user needs analysis:

- Task analysis definition, Techniques for task analysis, Sources of information

Unit 7: The design process – making use of task and user data for system design.

- Use cases, scenarios, Structuring the information, Information architecture, User and process flows, Wireframes, Mockups, comps, Other methods of conveying structure and function

Unit 8: Designing for universal access:

- What is accessibility? What is accessible software, Examples of accessibility adaptations, What’s driving software accessibility, Implications for software organizations
Unit 9: Speech user interfaces:
- Attributes of speech user interfaces, Evaluating speech user interface quality

Unit 10: HCI in mission-critical and high-risk environments:
- Safety implications of human-computer interaction, Effects of automation, Addressing the effects

Text books:

Reference Books:
- The Art of Human-Computer Interface Design Laurel, B Addison-Wesley 1990

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.
CSE 444 E                                      Fuzzy Logic

L       T       P
4       –       –

Class Work:  50
Exam:      100
Total:     150
Duration of Exam: 3 Hrs.

Unit - 1  Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, a-cuts, Properties of a-cuts, Decomposition, Theorems, Extension Principle,

Unit - 2  Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations


Unit - 4  Fuzzy Relations: Crisp & Fuzzy Relations, Projections & Cylindric Extensions, Binary Fuzzy Relations, Binary Relations on single set, Equivalence, Compatibility & Ordering Relations, Morphisms, Fuzzy Relation Equations.

Unit – 5  Possibility Theory: Fuzzy Measures, Evidence & Possibility Theory, Possibility versus Probability Theory.


Unit – 8  Applications of Fuzzy Logic in soft computing.

Text / Reference books :


Note:  Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.
Unit-1: Components of natural language processing: lexicography, syntax, semantics, pragmatics: word level representation of natural languages prosoty & natural languages.

Unit-2: Formal languages and grammars: chomsky hierarchy, Left-Associative grammars, ambiguous grammars, resolution of ambiguities.


Unit-4: Semantics-knowledge representation semantic networks logic and inference pragmatics, graph models and optimization, prolog for natural language semantic.

Unit-5: Application of NLP: intelligent work processors: Machine translation, user interfaces, Man-Machine interfaces, natural language querying, tutoring and authoring systems, speech recognition, commercial use of NLP.

Text Book:

Reference Books:
- “Language as a cognitive process”, Terry Winograd 1983, AW
- “Introduction of Formal Language Theory, Mdlj Arbib & Kfaury, 1988, Springer Verlog

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.
Object Oriented Systems Development

L  T  P
4  –  –

Class Work: 50
Exam: 100
Total: 150

Duration of Exam: 3 Hrs.

Unit-1: Introduction: Review of the Traditional Methodologies, Advantages of Object Oriented Methodologies over Traditional Methodologies, Classes, Objects, Encapsulation, Association, Aggregation, Inheritance, Polymorphism, States and Transitions.


Introduction to Rational Rose CASE tool: Introduction – Importance of Rational Rose, Capabilities of Rational Rose Case Tool.


Creating Use Case Diagrams: Actors and Use Cases, Use Case Relationships, Types of Relationships, Use Case Diagrams: Creating Main Use Case Relationships, Additional Use Case Diagrams in Rational Rose, Activity Diagrams Activities, Transitions, Decision Points, Swimlanes


Unit-4: Discovering Object Interactions: Documenting Scenarios using Interaction Diagrams, Types of Interaction Diagrams, Adding Behaviour and Structure: Representing Behaviour and Structure, Creating Attributes & operations and documenting them, Displaying attributes and operations, Association Classes, Analysing Object Behaviour: Modelling Dynamic Behaviour, States


Unit-6: The Iteration Planning Process: Benefits, Goals, Design the User Interface, Adding Design Classes, The Emergence of Patterns, Designing Relationships, Designing Attributes and Operations, Designing for Inheritance, Coding, Testing, and Documenting the Iteration.

Text Books:

• Visual Modeling with Rational Rose 2000 and UML By Terry Quatrani Foreword by Grady Booch, 2000

Reference Books:

• UML Distilled by Maxtin Fowler with Kendall Scott, 2000, Second Edition
• Sams Teach Yourself “UML” In 24 Hours By Joseph Schmuller, 2000

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.