B.Tech COMPUTER SCIENCE Engineering (AKU Syllabus) SEMESTER- VI

CS 1x14 SOFTWARE ENGINEERING
L–T–P : 3–0–3 Credit : 5
1. Introduction : S/W Engineering Discipline-Evolution and Impact, Program vs S/W Product, Emergence of S/W Engineering.
2. Software Life Cycle Models : Waterfall, prototyping, Evolutionary, Spiral models and their comparisons.
3. Software Project Management : Project Manager responsibilities, project planning, Project Size estimation Metrics Project Estimation, Techniques, COCOMO, Staffing Level Estimation, Scheduling, Organization & Team Structures Staffing, Risk Management, S/W Configuration Management.
4. Requirements Analysis and Specification : Requirement Gathering and Analysis, SRS, Formal System Development Techniques, Axiomatic and Algebraic Specification.
5. Software Design : Overview, Cohesion and Coupling, S/W Design Approaches, Object- oriented vs. Function- Operated Design.
6. Function- Oriented S/W Design : SA/ SD Methodology, Structured Analysis, DFDs, Structured Design, Detailed Design, Design Preview.
7. Object Modeling using UML : Overview, UML, UML Diagrams, Use Case Model, Class Diagram etc.
8. Object Oriented Software Development : Design Patterns, Object- Oriented analysis and Design Process, OOD Goodness Criteria.
9. User Interface Design : Characteristics, Basic Concepts, Types, Components Based GUI Development, User Interface Design Methodology.
10. Coding and Testing : Coding, Code Review, Testing, unit Testing, Black Box Testing, White- Box Testing, Debugging, Program Analysis Tools, Integration Testing, System Testing, General Issues.
11. Software Reliability and Quality Management : S/W Reliability, Statistical Testing, S/W Quality, S/W Quality management System ISO 9000, SEI CMM, Personal Software Process, Six Sigma.
12. Computer Aided Software Engineering: CASE and its Scope, Environment, Support, Other Characteristics.
13. Software Maintenance : Characteristics, S/W Reverse Engineering, S/W Maintenance Process Models, Estimation of Maintenance Cost.
14. Software Reuse : Basic Issues, Reuse Approach, Reuse at Organization Level.

Text Books:
1. Fundamental of Software Engineering by Rajeev Mall, PHI.
2. Software Engineering by James F. Peters, Wiley.
3. Software Engineering A. Practitioner's Approach by Pressman, MGH.
Reference Books:
1. Software Project Management From Concept to Development by Kieron Conway, Dreamtech Press.
2. Software Engineering by Sommerville, Pearson Education.
3. Software Engineering by Jawadekar, TMH.

CS 1x16 COMPILER DESIGN
L–T–P : 3–0–3 Credit : 5
1. Introduction to Compilers : Compilers and translators, The phases of a compiler, Compiler writing tools, The lexical and System structure of a language, Operators, Assignment statements and parameter translation. **Lecture : 2**
2. Lexical Analysis : The role of the lexical analyzer, Specification of tokens, Lexical analysis tool. **Lecture : 2**
3. Syntax Analysis : Role of Parser, CFG, Top – down parsing, Operator – precedence parsing, LR Parsers, The Canonical Collection of LR (0) items, Constructing SLR, Canonical LR and LALR parsing tables, Uase of ambiguous grammars in LR parsing, An automatic parser generator, Implementation of LR parsing tables and constructing LALR sets of items. **Lecture : 10**
4. Syntax Directed Translation : Syntax tree, Bottom-up evolution of S-attributed definitions, L-attributed common top-down translation, Bottom-up evaluation of inherited attributed, Recursive evaluators. **Lec : 5**
5. Type Checking : Static Dynamic Checking, Type expression, Type Checking, Type Equivalence, Type Conversion. **Lecture : 2**

6. Symbol Tables : Structure of Symbol Table, Simple Symbol Table (Linear Table, Ordered List, Tree, Hash Table, Scoped Symbol Table (Nested Lexical Scoping, One Table per Scope, One Table for all Scopes). **Lecture : 3**

7. Intermediate Code Generation : Intermediate Language, Intermediate representation Technique, Threeaddress code, Translation of assignment statements, Boolean expressions, Control Flow, Case Statement and Function Call. **Lecture : 4**

8. Code Generation : Factors affecting code generation, Basic Block, Code generation for tree, Register and assignment, DAG representation, Code generation using dynamic programming, code- generator generators**.**
Lecture : 4

9. Error Detection and Recovery : Errors, Lexical-Phase errors, Syntactic-Phase errors, Semantic errors.
Lecture : 2

10. Code Optimization : Need for optimization of Basic Blocks, Loops in flow graph, Optimizing transformation Compile time evaluation, common sub-expression elimination, Variable Propagation, Code Movement Optimization, Strength Reduction, Dead code optimization, Loop Optimization), Local Optimization, Global Optimization, Computing Global data flow equation, Setting up data flow Equations, Data Flow Analysis**. Lecture : 10**

Text Books:
1. Compilers Principles .Techniques. And Tools by Alfred V. Aho. Ravi Sethi Jeffery D. Ullman. Pearson Education.
2. Compiler Design by Santanu Chattopadhyay. PHI
Reference Book
Modern Compiler Design by Dick Grune . E. Bal. Ceriel J.H.Jacobs. And Koen G. Langendoen Viley Dreamtech.
Programming Lab (System Programming)
Design of lexical analyzers. Design of parsers like recursive – descent parser for a block structured language with typical constructs, Typical exercises using LEX and YACC, Quadruples/Triplex generation using LAX and YACC for a subset of a block structured language,LR (0), SLR, LALR error detection and recovering with code optimization.

CS 1X04 OBJECT ORIENTED ANALYSIS AND DESIGN
L-T-P : 3-0-0 Credit : 3
1. Introduction : Object Oriented Development & themes, Usefulness of OOPS, Object Modeling Technique.
Lecture : 6
2. Object Technique : Link Association, Generalization, Inheritance, Aggregation, Abstract Classes, Dynamic Modeling event & States. State Diagram, Nested State Diagram, Relation of Object & Dynamic Model, Functional Modeling, Data Flow Diagram, SSD, Use Case. **Lecture : 15**
3. Design Methodology : OMT Methodology, Analysis, Iterating the Analysis, System Design, Object Design, Comparison of Methodologies. **Lecture : 15**
4. Case Studies : Object oriented Language Relational Database. **Lecture : 8**

Text Books:
1. Object Oriented Modeling and Design by Rumbaugh, Pearson Education.
2. Object Oriented Analysis and Design: Understanding System Development with UML by Mike O Doherty, Wiley India.
3. Object Oriented Analysis and Design by Kahate, Tata McGraw Hill.
Reference Books:
1. Object Oriented Analysis and Design with Application by Gradv Booch, PearsonEducation.

CS 1X10 PRINCIPLES OF PROGRAMMING LANGUAGES
L- T- P : 3–0–0 Credit : 3
1. Language Design Issues : Impact on Programming paradigm, Role of Programming Environment.
Lecture : 3

2. Impact of Machine Architecture : Computer H/w, Firmware Computer, Transistor and virtual Architecture **Lecture : 5**

3. Language Translation Issues : Programming Language Syntax, Stages in translation, Formal Translation model (BNF Grammars, etc.), Formal properties of Languages, Languages Semantics Program Verification. **Lecture : 5**

4. Data Types : Properties of Types and Objects, Scalar Data Types, Composite Data Types, Structures Data Types, Abstract Data Types, Encapsulation by subprogram, Type Definitions. **Lecture : 4**

5. Inheritance: Derived class, Abstract Class, Inheritance & software Reuse, Polymorphism. **Lecture : 4**

6. Sequence Control : Implicit & Explicit Sequence control, Sequencing with Arithmetic Expression Sequence control, between statements, sequencing with Non-arithmetic Expression. **Lecture : 5**

7. Subprogram Control : Subprogram sequence control, Attributes of Data Control Parameter transmission, Static Scope, Dynamic scope, Block Structure. **Lecture : 5**

8. Storage Management : Element Requiring Storage. Programmer and system Controlled Storage, Static storage management, Heap storage management. **Lecture : 4**

9. Distributed Processing : Exceptions & Exception Handlers, Co-routines, Scheduled Subprogram, Parallel Programming, Persistence data & Transaction Systems, Network & Client server Computing. **Lecture : 4**

10. Case Study : Comparison between Ada, C, C++, Fortran, Java, LISP, ML, Perl, Prolog, Smalltalk, Postscript. **Lecture : 4**

Text Book:
1. Programming Languages: Design and Implementation, 4/e by Terrance W. Pratt, Marvin V. Zelkovitz, T. V. Gopal, Pearson Education.
2. Programming Languages: Concepts and Constructs by R. Sethi, Pearson Education.

Reference Books:
1. Fundamentals of Programming Languages by E. Horowitz, Galgotia,
2. Programming Languages , Paradigm and Practice by D. Appleby, McGraw Hill

CS 1X11 FORMAL LANGUAGES AND AUTOMATA THEORY
L–T–P : 3–0–0 Credit : 3

1. Introduction to Automata : Study and central concepts of automata theory, An informal picture of finite automata, deterministic and non-deterministic finite automata, application of finites automata, finite automata with epsilon transitions. **Lecture : 3**

2. Regular expression and Languages : Regular expression, finite automata and regular expressions, applications of regular expressions, algebraic law of regular expressions. **Lecture : 6**

3. Properties of Regular Language: Proving languages not to be regular, closure properties of regular languages, equivalence and minimization of automata. **Lecture : 4**

4. Context-free Grammars and Languages: Parse trees, Applications of context free grammars, Ambiguity in grammars and languages. **Lecture : 6**

5. Pushdown Automata: Pushdown automata (PDA), the language of PDA, equivalence of PDA's and CFG's, deterministic pushdown automata. **Lecture : 6**

6. Properties of Context-Free Languages: Normal forms of context free grammars, pumping lemma for context free languages, closure properties of context free languages. **Lecture : 5**

7. Introduction to Turing Machine: Te Turing machine, programming techniques for Turing machine, extensions to the basic Turing machine, restricted Turing machines, Turing machines and Computers, Undecidable Problem about Turing machine, Post's Correspondence Problems. **Lecture : 7**

8. Intractable Problem: The Classes P & NP, NP-Complete Problem, Example of P & NP Problem. **Lecture : 5**

Text Book:
1. Introduction to Automata Theory, Languages, and Computation, 2e by John E, Hopcroft, Rajeev Motwani, Jeffery D. Ullman , Pearson Education.
2. Theory of Computer Science (Automata, Languages and Computation), 2e by K. L. P. Mishra and N. Chandrasekharan, PHI

HS 1×06 INDUSTRIAL ECONOMICS & ACCOUNTING
L-T-P : 3-1-0 Credit : 4
1. Various definitions of Economics : Nature of Economic Problem, Relation between science, Engineering. Technology & Economics **Lecture : 3**
2. Meaning of demand, Law of Demand, Elasticity of demand, Practical importance & application of the concept of elasticity of Demand **Lecture : 5**
3. Meaning of Production and factor of Production : Land, labor, Capital ,Entrepreneur & Organization –their Characteristics law of variable Proportion .Return to Scale **Lecture : 5**
4. Cost Analysis : Various concept of cost, Cost function, Short & Long run cost. Concept of Revenue ,Break- Even Analysis **Lecture : 5**
5. Meaning of Market : Type of market – Perfect completion, Monopoly ,Oligopoly ,Monopolistic competition ,Main feature of these market), Meaning of Supply and Law of Supply, R ole of Demand & Supply in price in prime determination imperfect t competition **Lecture : 7**
6. Engineering Economy : (a) Simple and compound interest, Annuities, (b)Basic methods For making economy Studies - (i) Present worth method, (ii) Future worth method (iii)I.R.R method (c) Comparison of alternative – (i) Present worth method, (ii) Future Worth method (iii) I.R.R method. **Lecture : 7**
7. Accounting: Meaning Scope and Role of accounting , Accounting concept & Convention. Accounting as information System. Recording of transaction in journal and Ledgers. Trial –Balance, Preparation of final Account. [**Lecture : 9**]

Text Book :
1. Modern Micro Economics by Theory - H.L.Ahuja-S.Chand
2. Advance Economic Theory by M .L.Jhingan- Konark Publication
3. Engineering Economics by Degarmo , Sullican & Canada –McMillan
4. Double Entry Book Keeping by T.S.Grewal –S .Chand
Reference Books :
1. Stonier & Hague by A test book of Economic Theory-Pearson
2. Industrial Organisation and Engg. Economics by Banga & Sharma

CS 1X07 WEB APPLICATION DESIGN AND DEVELOPMENT
L- T- P : 3- 0- 3 Credit : 5
1. Database Connectivity : Concept of JDBC (Java Database Connectivity), working with SQL, Stored Procedures. **Lecture : 5**
2. Client Server Side Programming : Java Script- Introduction, data types, variables, operators, Array Objects, Date, Objects, String Objects, Document Object Model, Image Object, Event handling, Browser Object, Window Object, Location Object, History Object, Submit event and data validation. Understanding Servlet programming, its Life- Cycle, Servlet Configuration, understanding Servlet sessions, understanding of JSP and JSLT, JSP documents, Elements, tag extensions, tag libraries, validation, translation time mechanism translation- time classes, Understanding Java Server Pages Standard Tag Library, tags in JSLT, core tag library, XML tag library using Internationalization Actions. [**Lecture : 20**]
3. J2EE : Advantages of J2EE, Enterprise Architecture Types, Understanding EJB, its architecture, EJB Roles, Benefits and limitations of Enterprise beans, session beans: Stateful and Stateless beans, Entity Beans, Beans Managed Persistence, Container Managed Persistence, Introduction to Web Containers. **Lecture : 10**
4. Network Programming : Java Socket programming for TCP and UDP, RMI (Remote Method Invocation). [**Lecture : 2**]
5. Case Study : Web Applications, Web Applications Life Cycle, Enterprise Application Development process, Deploying Web Applications. **Lecture : 5**

Text Books:
1. Java Server Programming J2EE, 1.4 Edition Black Book (Dreamtech Press)
2. Core Java TM Volume II by Cay S. Horstmann & Gray Cornell (Pearson)
Reference Book:
J2EE 1.4 Bible by McGovern (Wiley India)