SHIVAJI UNIVERSITY KOLHAPUR

REVISED SYLLABUS AND STRUCTURE

SECOND YEAR (B. Tech)

Computer Science and Engineering

To be introduced from the academic year 2019-20

(i.e. from June 2019) onwards

(Subject to the modifications will be made from time to time)

													AS PER BOS GUIDELINES			AS PER BOS GUIDELINES		
SEMESTER - IV																		
1	PCC-CS401 Automata Theory	3	3	3							CIE / ESE	30 / 70	100	40					
2	PCC- CS402 Computer Networks - II	3	3	3				1	2	2	CIE / ESE	30 / 70	100	40		50	20		25	10
3	PCC- CS403 Computer Organization and Architechture	3	3	3							CIE / ESE	30 / 70	100	40						
4	PCC- CS404 Operating Systems - I	3	3	3	1	1	1				CIE / ESE	30 / 70	100	40					25	10
5	PCC- CS405 Software Engineering	3	3	3							CIE / ESE	30 / 70	100	40						
6	PCC- CS406 Object Oriented Programming	2	2	2				2	4	4						50	20		50	20
7	PW- CS407 Mini Project							1	2	2						50	20		50	20
8	MC-CS408	2	2	2				1	2	2	CIE / ESE	30 / 70	100	40						
	Total	*19*	*19*	*19*	*1*	*1*	*1*	*5*	*10*	*10*			*600*			*125*			*175*	
	Total	**37**	**37**	**37**	**3**	**3**	**3**	**10**	**20**	**20**			**1000**			**250**			**350**	

S. Y. B.Tech (Computer Science and Engineering) Sem – IV

PCC-CS-401– Automata Theory

	TEACHING SCHEME	EXAMINATION SCHEME
	Theory : 3 Hrs/Week	**Term work:** 25 marks
	Tutorial : 1 Hrs/Week	**Theory** : 100 marks
	Practical: --	**Practical** : --

Prerequisite: Basic Mathematical Concepts, Sets, graphs.
Course Objectives:
1. To introduce students to the mathematical foundations of computation, the theory of formal languages and grammars
2. To strengthen the students' ability to understand and conduct mathematical proofs for computations
3. To make the students understand the use of automata theory in Compliers & System Programming.
4. To analyze and design finite automata, pushdown automata, grammars & turing machines

Course Outcomes:
Upon successful completion of this course, the student will be able to –
1. Understand basic concepts of Regular Language and Regular Expressions
2. Select appropriate abstract machine to recognize a given formal language.
3. Generate complex languages by applying Union, Intersection, Complement, Concatenation and Kleene * operations on simple languages.
4. Apply parsing concepts for syntax analysis.
5. Be familiar with thinking analytically and intuitively for problem solving situations in related areas of theory in computer science.

1 **Regular Languages and Finite Automata**
Proofs, Recursive Definitions, Regular expressions and regular languages, Finite Automata, unions, intersection & complements of regular languages, Applications of FA   7

2 **Nondeterminism and Kleene's Theorem**
Nondeterministic finite automata, NFA with null transition, Equivalence of FA's, Kleene's Theorem (Part I & Part II), Minimal Finite Automata   6

3 **Context free Grammars**
Definition, Union, Concatenation and Kleene *'s of CFLs, Derivation trees and ambiguity, Simplified forms and normal forms   5

4 **Parsing and Pushdown Automata**   6

Definition of Pushdown Automata, Deterministic PDA, Equivalence of CFG's & PDA's, Top down parsing, bottom up parsing.

Context free languages

5 CFL's and non CFL's, Pumping Lemma, intersections and complements of CFLs   5

Turing Machines

6 Definition, TM as language acceptors, combining Turing Machines, Computing   7
   partial function with a TM, Multi-tape TMs, and Universal TM

Term work:

- It should consist of minimum 10-12 assignments based on topics of syllabus, exercise problems from the textbooks.
- 3-4 assignments should be implemented using programming language.

Text Books:

1. Introduction to Languages & the Theory of Computations - John C. Martin (Tata MGH Edition)
2. Discrete Mathematical Structures with applications to Computer Science - J .P. Trembley & R. Manohar (MGH)

Reference Books:

1. Introduction to Automata Theory, Languages and computation - John E. Hopcraft, Raje
2. Motwani, Jeffrey D. Ullman (Pearson Edition)
3. Introduction to theory of Computations - Michael Sipser (Thomson Books/Cole)
4. Theory of Computation - Vivek Kulkarni
5. Theory of Computation A problem Solvin

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PCC-CS-402– Computer Networks-II

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Term work:** 25 marks
Tutorial : __	**Theory** : 100 marks
Practical: 2 Hrs/Week	**Practical** : 50 Marks

Prerequisite: Computer Network-I.
Course Objectives:
1. To understand the Client server model & socket interface
2. To perceive IPv6 addressing and protocol
3. To explain and learn basic internet technology protocols
4. Simulate protocols using software tools.

Course Outcomes:
Upon successful completion of this course, the student will be able to –
1. Graduates will be able to program the client server model using sockets
2. Graduates will understand and apply next generation protocol and addressing model
3. Graduates will elaborate the fundamentals of Domain Name Systems
4. Graduates will apply the concepts of Remote login and FTP in network applications
5. Graduates will learn fundamentals of web, HTTP and e-mail communication protocols.
6. Graduates will understand multimedia streaming and relevant protocols.

1	**Client server model & socket interface:** The Socket Interface, The Client Server model and Software design, Concurrent processing in client-server software, Algorithms and issues in Client-Server design, Multiprotocol Servers, Multiservice Servers, Concurrency in clients, Unix Internet Super server (inetd).	6
2	**Next Generation IPv6 and ICMPv6:** IPV6 addresses, packet format, ICMPV6, Transaction from IPV4 to IPV6	5
3	**BOOTP, DHCP and Domain name system:** Name Space, Domain Name Space, Distribution of name space, and DNS in internet, Resolution, DNS massages, Types of records, Compression examples, and encapsulation. BOOTP, DHCP	6
4	**Remote Login: TELNET and File Transfer FTP, TFTP:** Concept, NVT, Embedding, Options & options/sub-option negotiation, controlling	6

the server, Out-of-band signaling, Escape charter, Mode of operation, user interface.
FTP: Connections, Communication, Command processing, File transfer, User interface, Anonymous FTP, TFTP.

	Web Applications Service Protocols:	
5	HTTP: Architecture, Web Documents, HTTP Transaction, Request and Response, HTTP Headers and Examples, Persistent Vs Non- Persistent HTTP, Proxy servers. **Electronic Mail:** Architecture, User agent, addresses, Delayed delivery, SMTP commands and responses, Mail transfer phases, MIME, POP3	7

	Multimedia In Internet:	
6	Streaming stored audio/video, Streaming live audio/video, Real time interactive audio/video, Real Time Transport Protocol (RTP), Real Time Transport Control Protocol (RTCP), Voice Over IP (VoIP), Session Initiation Protocol (SIP)	6

Term work:

It should consist of minimum 8 - 10 experiments based on the following guidelines
a. Client program using UDP to connect to well known services (echo, time of the day service etc.).
b. Implementing concurrent TCP multiservice client/server.
c. Implementing Iterative UDP client/server.
d. Study of following DNS Tools with all its options. nslookup, dig, host, whois.
e. Implement trivial file transfer protocol (TFTP).
f. Configuration of basic services for FTP,HTTP,Telnet etc. on Linux Platform
g. Write program to send a mail using SMTP commands and receive a mail using POP3 commands.
h. Capturing & Analyzing operation of various application layer protocols using network protocol analyzer. (Wireshark and tcpdump)
i. Study of various streaming multimedia protocols in Internet (Using various audio/video streaming services on the Internet)

Text Books:
1. TCP/IP Protocol Suite by Behrouz A. Forouzan McGraw-Hill Publication, 4th Edition.
2. Computer Networks by Andrew S Tanenbaum.

Reference Books:
1. Data Communications and Networking by Behrouz A Forouzan
2. Internetworking with TCP/IP by Douglas Comer
3. Computer Networking: A Top-Down Approach by Jim Kurose

S. Y. B.Tech (Computer Science and Engineering) Sem –IV

PCC-CS-403–Computer Organization and Architecture

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	Term work: --
Tutorial : __	Theory : 100 marks
Practical: --	Practical : --

Prerequisite: Basic Computer and Microprocessor

Course Objectives:
1. To provide a high-level overview of Computer organization.
2. To discuss the basic of I/O addressing and access.
3. To make the students aware of overall design and architecture of computer and its organization.
4. To analyze performance issues in processor and memory design of a digital computer.

Course Outcomes:

Upon successful completion of this course, the student will be able to –
1. Students will be able to recapitulate the history of computer system and the basic concepts of computer architecture and organization.
2. Students will be able to understand the concept of I/O organization.
3. Students will able to apply the different algorithms to perform arithmetic operations.
4. Students will be able to articulate the design issues in the development of processor.
5. Students will be able to conceptualize instruction level parallelism.
6. Students will be able to understand the concept of memory techniques.

1	**Computer Evolution and Performance** Evolution of computer – Mechanical Era: Babbage's Difference Engine, Electronic Era: First generation, IAS Computers, Instruction Set and Instruction Execution, Second generation, Input-Output Operation, Programming Language, Third generation and VLSI Era - IC Circuits, Performance Consideration and Measures, Speed up Techniques, Difference between RICS and CISC.	5
2	**Input and Output Organization** Accessing I/O devices, Direct Memory Access (DMA), Buses: Synchronous Bus and Asynchronous Bus, Interface Circuits, Standard IO Interface.	6
3	**Arithmetic** Addition and Subtraction of Signed Numbers, Design of fast Adders, Multiplication of Positive numbers , Signed Operand Multiplication, Fast Multiplication, Integer Division, Floating Point Number Operations: IEEE 754 Floating Point Format, Arithmetic Operations	8
4	**The Processing Unit** Some fundamental Concepts, Execution of complete Instruction, Multiple bus organization, Hardwired control, Microprogrammed Control	6

Pipelining

5   Basic Concepts: Role of Cache Memory, Pipeline Performance. Data Hazards: Operand   5
Forwarding, Handling Data Hazards in Software and Side Effects and   Instruction Hazards:
Unconditional Branches and Conditional Branches and Branch Prediction

Computer Memory System

6   Some Basic Concepts, Types of Memories :ROM and RAM, Semiconductor RAM memory,   6
Cache Memories: Mapping functions, Replacement Algorithms, Example of Mapping
Techniques

Text Books:

1. Computer Architecture and Organization-John P Hayes (MGH) 3rd Edition
2. Computer Organization – Carl Hamacher , Zvonko Vranesic and Safwat Zaky . Publisher: Tata McGraw Hill. 5th Edition.

Reference Books:

4. Computer Systems Organization & Architecture – John D. Carpinelli (Pearson Education)
5. http://cse.stanford.edu/class/sophomore-college/projects-00/risc/risccisc/(RISC vs CISC)
6. http://www.cpu-world.com/sspec/

S. Y. B.Tech (Computer Science and Engineering) Sem – IV

PCC-CS-404– Operating System I

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Term work:** 25 marks
Tutorial : 1 Hrs/Week	**Theory** : 100 marks
Practical: --	**Practical** : --

Prerequisite: Computer Network-I.
Course Objectives:
1. To make the students understand basic concepts of operating system
2. To expose the students to various functions of the Operating system and their usage
3. To give hands on exposure to Linux commands and system calls.

1	**Overview of OS**	
	1.1. Abstract view of an operating system	
	1.2 Fundamental principles of OS operations	6
	1.3 OS interaction with the computer and user programs	
	1.4 Efficiency ,system performance and user service	
	1.5Batch Processing System	
	1.6 Multiprogramming System	
	1.7 The Time Sharing System	
	1.8 The Real Time Operating System	
	1.9 Distributed operating system	
	1.10 Operation of OS, Operating system with monolithic structure	
	1.11Virtual machine operating system	
	1.12Kernel based operating system, Microkernel based operating system	

2	**Processes, Threads and Synchronization**	
	2.1 Processes and programs	6
	2.2 Implementing processes	
	2.3 Threads	
	2.4 Process synchronization	
	2.5 Race condition, Critical Section, Synchronization approaches	
	2.6 Classic process synchronization problems	
	2.7 Semaphores, Monitors	

3	**Process Scheduling**	
	3.1 Scheduling terminology and concepts	6
	3.2 Non preemptive scheduling policies	
	3.3 Preemptive scheduling policies	

3.4 Long, Medium and short term scheduling

Deadlock

4 4.1 What is deadlock   6

4.2 Deadlock in resource allocation

4.3 Handling Deadlocks : Deadlock Detection and Resolution

4.4 Deadlock prevention

4.5Deadlock avoidance

Memory Management

5 5.1 Managing the memory hierarchy   6

5.2 Static and Dynamic Memory Allocation

5.3 Heap Management

5.4 Contiguous Memory Allocation and Non Contiguous Allocation

5.5 Segmentation and Segmentation with paging

5.6 Virtual memory basics, Demand paging

5.7Page replacement policies

File systems and I/O systems

6 6.1Overview of file processing   6

6.2Files and file operations

6.3Fundamental file organizations and access methods

6.4 Layers of the Input Output control system

6.5 Overview of I/O system

Term work:

The tutorials should be conducted on the following guidelines.

1. Six assignments should be based on theoretical / analytical concepts, preferably from the exercises of the books covering all topics of the syllabus.
2. Four assignments should on usage of Unix / Linux commands and system calls concerned with General purpose utilities, file system, handling ordinary files, basic file attributes, the Shell, the Process and Filters using regular expressions as mentioned in the reference book at serial no. 1.
3. Installation of any two operating system using VMware.

   These assignments should be practically conducted during the tutorial sessions.

Text Books:

1. Operating Systems -A Concept Based approach -Dhananjay M Dhamdhere (TMGH).3rd edition.
2. Operating System Concepts -Abraham Silberschatz, Peter B. Galvin & Grege Gagne (Wiley)

Reference Books:

1. Unix Concepts and Applications –Sumitabha Das (TMGH).
2. Operating System: Concepts and Design -Milan Milenkovic (TMGH)
3. Operating System with case studies in Unix, Netware and Windows NT -Achyut S. Godbole (TMGH).

S. Y. B.Tech (Computer Science and Engineering) Sem – IV

PCC-CS-405– Software Engineering

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Term work:** --
Tutorial : --	**Theory** : 100 marks
Practical: --	**Practical** : --

Course Objectives:
1. To expose the students to basic concepts & principles of software engineering.
2. To make the student aware of the importance of SDLC in their project development work.
3. To expose the students to software testing techniques and software quality management.

Course Outcomes:
1. Comprehend systematic methodologies of SDLC(Software Development Life Cycle)
2. Discriminate competing and feasible system requirements indicating correct real world problem scope and prepare stepwise system conceptual model using stakeholder analysis and requirement validation.
3. Prepare SRS document for a project
4. Apply software design and development techniques
5. Develop a quality software project through effective team-building, planning, scheduling and risk
6. Understand testing methods at each phase of SDLC

1	**Unit 1: The software Problem** 1.1 Cost, Schedule & Quality 1.2 Scale and Change 1.3 Software Processes: Process & Project, Component Software Processes, Software Development process Models, Project Management Process.	6
2	**Software Requirements Analysis & specification** 2.1 Value of Good SRS 2.2 Requirement Process 2.3 Requirements Specification 2.4 Other Approaches for Analysis 2.5 Validation	5
3	**Software Planning & Scheduling**	6

3.1 Responsibilities of Software Project Manager
3.2 Project Planning
3.3 Project Scheduling
3.4 Project Staffing
3.5 People CMM
3.6 Risk Management

4 **Design** 6
4.1 Design Concepts
4.2 Function Oriented Design
4.3 Object Oriented Design
4.4 Detail Design
4.5 Verification
4.6 Metrics

Coding & Testing
5 5.1 Coding & Code Review 7
5.2 Testing
5.3 Unit Testing
5.4 Black Box Testing
5.5 White Box Testing
5.6 Program Analysis Tools
5.7 Integration Testing
5.8 System Testing

Software Reliability & Quality Management
6 6.1 Reliability 6
6.2 Software Quality
6.3 Software Quality Management System
6.4 ISO 9000
6.5 SEI capability Maturity Model
6.6 Six Sigma
6.7 Agile Software Development & Extreme Programming
6.8 Agile Project Management

Text Books:
1. Software Engineering: A precise Approach - Pankaj Jalote (Wiley India) (Unit 1,2,4).
2. Fundamentals of Software Engineering – Rajib Mall (3rd Edition)(PHI) (Unit 5, 6).
3. Software Engineering by Jan Sommerville (9th Edition) Pearson (Unit 6, 7 & 6.8).
4. Software Engineering Principles & Practices by Rohit Khurana ITLESL (2nd Edition) Vikas Publishing House Pvt. Ltd. (Unit 3).

Reference Books:
1. Software Engineering - Concepts & Practices -- Ugrasen Suman (Cenage Learning)
2. Software Engineering Fundamentals -- Behforooz & Hudson (Oxford: Indian Edition 1st)

S. Y. B.Tech (Computer Science and Engineering) Sem – IV

PW-CS407– Mini Project

TEACHING SCHEME	EXAMINATION SCHEME
Theory : --	**Term work:** 25 marks
Tutorial : --	**Theory** : --
Practical: 2 Hrs/Week	**Practical** **:** 50 marks

Pre-requisites: Knowledge of software engineering and C/C++

Course Objectives:
1. To expose the students to solve the real world problems.
2. To utilize the techniques. Skills and modern Engineering tools for building the project.
3. To follow the methods and tasks as per SDOLC Approach

Course Outcomes:
1. Define the problem statement.
2. Organize, Plan and prepare the detailed project activities.
3. Construct Flowchart, System Architecture based on the project description
4. Implement the solution for their problem.

Platform: - C, C++

Course Contents/Description:-

       The Mini Project should be undertaken preferably by a group of 3-4 students who will jointly work together and implement the project. The Mini Project topic should be based on the any one subject concepts that students have studied for their Academic Year. The group will select the project with the approval of the guide and submit the name of the project with a synopsis of the proposed work not more than 02 to 03 pages. In the Synopsis they have to state Flowchart, Usage of the logic, algorithm, functions and suitable data structure for implementing the solution. They have to implement project using C, C++ languages.