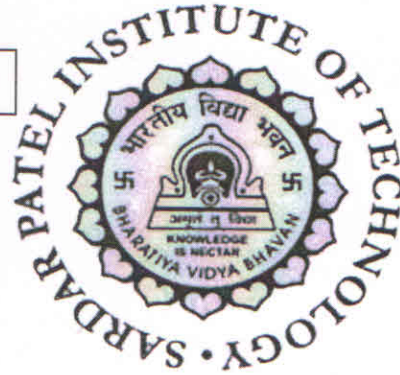



Bharatiya Vidya Bhavan's
Sardar Patel Institute of Technology
(Autonomous Institute Affiliated to University of Mumbai)

Revision: SPIT-3-17



Bachelor of Engineering/Technology (B.E./B.Tech)
in
Computer Engineering

Third Year Engineering
(Sem. V and Sem. VI)
Effective from Academic Year 2017 -18


Principal
Sardar Patel Institute of Technology
Bhavans Andheri Campus
Munshi Nagar, Andheri (West),
Mumbai - 400 058.



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
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Preamble:



Concept of academic autonomy is based on the argument that Institutions can undertake the work expected of them by all stakeholders such as Students , Parents , University , Industry , Society in general, only if they have freedom of choice and action. We at S.P.I.T. would like to believe that this freedom of choice and action as far as academics is concerned will make us more Proactive in our offerings.

An academic autonomy is as good as its Curricula and execution of it is as well as its faculty. S.P.I.T. is confident of succeeding on both the fronts.

In the first offering we have tried to pro-actively bridge the ever discussed “Industry-academic gap” by way of our SCOPE program. The issue about sensitizing students to social needs is being addressed by special activity based courses. Liberal arts courses have been introduced to enhance functionality of both sides of brain. In all this the professional core has not been overlooked. Thus the curricula are designed to achieve multi dimensional outcomes.

The evaluation mechanism is tuned for assessing the attainment of the designed outcomes and is designed as a fair mechanism.

As our learning cycle begins from July 2017, I wish to place on record that entire S.P.I.T. staff and faculty will work with singular focus and commitment towards the success of this endeavour.

Dr. Prachi Gharpure
Principal, S.P.I.T.



Sardar Patel Institute of Technology

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(Autonomous Institute Affiliated to University of Mumbai)

From the Desk of Dean Academics



Greetings and congratulations to all the students, teaching and supporting staff of Sardar Patel Institute of Technology for getting autonomous status to the institute from the year 2017-18. We look towards autonomy as a great opportunity to design and implement curriculum sensitive to needs of Indian Society and Industries.

In the proposed curriculum we have made an attempt to provide opportunity for students to develop themselves as competent engineering graduates with knowledge, skill and ethical behavior required for global career. Curriculum is designed to provide multiple learning opportunities for students to acquire and demonstrate competencies for rewarding careers. The curriculum model is outcome based that focuses on learning by doing. This is achieved through activity based learning, minor projects, problem solving and innovative styles of pedagogy. Various steps are taken to transform teaching-learning process to make learning a joyful experience for students. Special laboratory based courses are introduced to give more practical exposure to the students.

To create socially responsible citizen curriculum offers courses like Constitution of India, Environmental Studies and Human Health Systems Approach. Also various activity based learning modules like 'Building Automation, Fire Safety and Electronic Security', 'Occupational Safety & Legal Studies for Engineers', 'Technical Presentation Skills', 'Technical Paper and Patent Drafting', 'Engineering Solution for Environmental Problems' and 'Financial Planning, Taxation Policies and Investment' are introduced. For overall development of the learner, various elective courses like Yoga Vidya, Music Appreciation, Dramatics, Industrial and Organizational Psychology, Law for Engineers, French Language, German Language etc. are introduced. To encourage interdisciplinary studies institute level Open Elective courses are offered.

One of the special feature of this curriculum is Skill development programme called SCOPE (Skill Certification for Outcome-Based Professional Education) planned to enhance employability, innovation and research culture in the institute. Every department is offering six domain specific tracks, each track containing six courses. Student will have an opportunity to enroll for more than 140 courses in any of the department of his choice. Some of the courses under SCOPE will be delivered in co-ordination with industries.

We believe that this curriculum will raise the bar of academic standards with the active involvement and cooperation from students, academic and administrative units. Faculty of S.P.I.T. deserves a special appreciation for their relentless efforts in designing curriculum and assessment instruments which will bring transformation in the quality and transparency in assessment of learners.

Looking forward for your active cooperation and constructive feedback to create vibrant and joyful learning environment at Sardar Patel Institute of Technology.

Dr. Surendra Singh Rathod
Professor and Dean Academics



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
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Message from Head of the Department



The Computer Engineering is organized and administrated in accordance to industry to provide a professional atmosphere for students to enrich the discipline of computer. In particular, we aim, to produce highly qualified and all round graduates not only possessing fundamental knowledge of computing and technology but also to provide leadership and service to the community. The objective of the syllabus is to train students for reading, innovative thinking, and presentation habits. The Department is offering a well-balanced undergraduate computer engineering program designed considering technological, scientific, and humanistic study. B.Tech. programme is a 180-credit degree programme, which is spread over 8 semesters for a full-time student.

The syllabus is directional in wide scope and allows the much desired flexibility to keep speed with the ever growing body of knowledge and explorations in ICT enabled industries considering human side of enterprise. The course structures are carefully designed so that students get superiority in dealing with diverse situations when they step into the corporate world. The Skill Certification for Outcome-based Professional Education (SCOPE) Courses which are framed with respect to Industry expectations in mind surely helps students to develop their skills required.

Sardar Patel Institute of Technology's has taken a lead in incorporating philosophy of Choice Based Education in the process of curriculum development. This program subscribes to the view that a bachelor degree can be used as a stepping stone for master degree and research as well. We give you best wishes to take this syllabus and travel the path of success.

Dr. D. R. Kalbande
Head of Computer Engineering Department



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

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SEM V					
Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits
		L	T	P	Total
CPC501	Microprocessor	4	--	--	4
CPC502	Operating System	4	--	--	4
CPC503	Structured and Object Oriented Analysis and Design	4	--	--	4
CPC504	Computer Networks	4	-	--	4
CPL501	Web Technology Laboratory	-	-	4	2
CPL502	Business Communication and Ethics	--	--	2+2*	2
CPCL501	Microprocessor Laboratory	--	--	2	1
CPCL502	Operating System Laboratory	--	--	2	1
CPCL503	Structured and Object Oriented Analysis and Design Laboratory	--	--	2	1
CPC504	Computer Networks Laboratory	--	--	2	1
	Total	16	--	16	24

* 2 hours shown as practical to be taken class wise and other 2 hours to be taken as batch wise



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

(Autonomous Institute Affiliated to University of Mumbai)

SEM VI					
Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits
		L	T	P	Total
CPC601	System Programming and Compiler Construction	4	--	--	4
CPC602	Software Engineering	4	--	--	4
CPC603	Distributed Database	4	--	--	4
CPC604	Mobile Communication and Computing	4	--	--	4
CPE601X	Elective-I	--	--	2+2*	2
CPL601	Networking Programming Laboratory	--	--	4	2
CPCL601	System Programming and Compiler Construction Lab	--	--	2	1
CPCL602	Software Engineering Lab	--	--	2	1
CPCL603	Distributed Database Lab	--	--	2	1
CPCL604	Mobile Communication and Computing	--	--	2	1
	Total	16	--	16	24

* Hours shown as practical to be taken class wise.

Elective Code (CPE601X)	Elective Name
CPE6011	Operation Research
CPE6012	Project Management
CPE6013	Foreign Language – German
CPE6014	Foreign Language – French



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Semester- V



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPC501	Microprocessor	4	-	--	4	-	--	4
		Examination Scheme						
		ISE	MSE	ESE				
		10	30	100 (60% Weightage)				

Pre-requisite Course Codes	-
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At end of successful completion of this course, student will be able to

Course Outcomes	CO1	Create assembly language and mixed language programs for 8086 based system.
	CO2	Design system using memory chips and peripheral chips for 8086 microprocessor.
	CO3	Illustrate techniques to improve performance of microprocessors.
	CO4	Distinguish between RISC and CISC.

Module No.	Topics	Ref.	Hrs.
1	Intel 8086/8088 Architecture 8086/8088 Microprocessor Architecture, Pin Configuration, Programming Model, Memory Segmentation, Study of 8284 Clock Generator, Operating Modes, Study of 8288 Bus Controller, Timing diagrams for Read and Write operations, Interrupts.	1-13	10
2	Instruction Set and Programming Instruction Set of 8086, Addressing Modes, Assembly Language Programming, Mixed Language Programming with C Language and Assembly Language.	1-13	8
3	System designing with 8086 Memory Interfacing: SRAM, ROM and DRAM (using DRAM Controller-Intel 8203). Applications of the Peripheral Controllers namely 8255-PPI, 8253-PIT, 8259-PIC and 8237-DMAC. Interfacing of the above Peripheral Controllers with 8086 microprocessor. 3.3 Introduction to 8087 Math Coprocessor and 8089 I/O Processor.	1-13	12
4	Intel 80386DX Processor	1-13	6



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

	Study of Block Diagram, Signal Interfaces, Bus Cycles, Programming Model, Operating Modes, Address Translation Mechanism in Protected Mode, Memory Management, Protection Mechanism.		
5	Pentium Processor Block Diagram, Superscalar Operation, Integer & Floating Point Pipeline Stages, Branch Prediction, Cache Organization. Comparison of Pentium 2, Pentium 3 and Pentium 4 Processors. Comparative study of Multi core Processors i3, i5 and i7.	1-13	8
6	Super SPARC Architecture SuperSPARC Processor, Data Formats, Registers, Memory model. Study of SuperSPARC Architecture.	1-13	4
Total			48

References:

- [1] Douglas Hall, "Microprocessor and Interfacing" Tata McGraw Hill.
- [2] Liu & Gibson, "Microcomputer Systems: 8086/8088 family Architecture, Programming and Design". PHI Publication.
- [3] Tom Shanley & Don Anderson, "Pentium Processor System Architecture", Addison-Wesley.
- [4] Daniel Tabak, "Advanced Microprocessor", Tata McGraw Hill.
- [5] Walter A Triebel, "The 80386DX Microprocessor: Hardware, Software and Interfacing", Prentice Hall.
- [6] John Uffenbeck, "8086/8088 family: Design Programming and Interfacing", PHI.
- [7] Barry B. Brey, "Intel Microprocessors", Pearson Education India, 8th Edition.
- [8] Swati Joshi, Atul Joshi, Hemlata Jadhav, "Processor Architecture and Interfacing", Wiley.
- [9] Das Lyla B, "The X86 Microprocessors: Architecture and Programming (8086 to Pentium)", Pearson Education India.
- [10] The SPARC Architecture Manual
- [11] Intel Manuals
- [12] Steven Armbrust, Ted Forgeron, "Programmer's Reference Manual for IBM Personal Computers", McGraw Hill
- [13] Peter Abel, "IBM PC Assembly Language and Programming", Prentice Hall of India, 5th Edition.



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPC502	Operating System	4	-	--	4	-	--	4
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60% Weightage)		

Pre-requisite Course Codes	CPC403(Computer Organization and Architecture)	
At end of successful completion of this course, student will be able to		
Course Outcomes	CO1	Describe the functions of Operating Systems.
	CO2	Compare and contrast common algorithm used for preemptive and non-preemptive scheduling.
	CO3	Demonstrate potential run time problems arising from the concurrent operations and many separate tasks.
	CO4	Defend the different ways of allocating memory tasks.
	CO5	Demonstrate file system operations.

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	Introduction to Operating System: Objectives and Functions of O.S., OS Services, Special purpose systems, Types Of OS,	1	4
	1.2	System Calls, types of system calls,	1	
	1.3	Operating system structure, System Boot	1,2	
2	2.1	Process Management : Process concept, operations on process, Process scheduling: basic concepts , scheduling criteria , scheduling algorithms, Preemptive, Non-preemptive, FCFS ,SJF ,SRTN ,Priority based, Round Robin ,Multilevel Queue scheduling,Operating System Examples.	1,2	5
	2.2	Synchronization: Background , the critical section problem , Peterson's Solution, Synchronization Hardware Semaphores, classic problems of Synchronization: The Producer Consumer Problem:Readers writers problem, Semaphores, Dinning Philosopher Problem	1,2	5
	2.3	Deadlock : Deadlock Problem, Deadlock Characterization, Deadlock Prevention. Deadlock avoidance Banker's algorithm for single & multiple resources , Deadlock recovery , Deadlock Detection,	1,2	4



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

3	3.1	Memory Management : Memory management strategies: background , swapping ,contiguous memory allocation, paging , structure of page tables , segmentation	1,3	3
	3.2	Virtual memory management: Demand paging , copy-on write,Page replacement, FIFO, Optimal, LRU, LRU Approximation,Counting Based, , Allocation of frames , Thrashing	1,3	2
4	4.1	File Management: Files-System Structure, File System implementation, Directory implementation, Allocation Methods contiguous allocation, linked list allocation, indexed allocations, Free space management.	1,2	4
	4.2	Secondary storage : structures: Disks Scheduling Algorithm: FCFS, SSTF, SCAN, CSCAN, LOOK, Disk Management	1,2	2
	4.3	Input Output Management: Overview , I/O Hardware , Application I/O Interface	1,2	2
5	5.1	Case Study of UNIX: History of UNIX, Overview of UNIX ,UNIX File System, Data structures for process/memory management ,Process states and State Transitions, Using the System(Booting and login),Process scheduling , Memory management , Shell programming	4,5	8
	5.2	Case Study of Linux History , Design Principles , Kernel Modules , Process management , Scheduling , Memory management , File Systems ,Input and Output , Inter process communication , Network structure , Security	4,5	5
	5.3	Case study: Windows 7 : History, Design Principles , System components , environmental subsystems , File System, Networking, Programmer Interface	1	4
			Total	48

References:

- [1] Silberschatz A., Galvin P., Gagne G. "Operating Systems Principles", Willey Eight edition
- [2] William Stallings,"Operating System-Internal & Design Principles", Pearson
- [3] Andrew S. Tanenbaum, "Modern Operating System", Prentice Hall.
- [4] Maurice J. Bach,"The Design of Unix Operating System", Prentice Hall.
- [5] Unix and Shell Programming by B. M. Harwani Oxford



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPC503	Structured and Object Oriented Analysis and Design	4	-	--	4	-	--	4
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60% Weightage)		

Pre-requisite Course Codes	-
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At end of successful completion of this course, student will be able to

Course Outcomes	CO1	Understand the Concepts of System Development Life Cycle
	CO2	Apply techniques to get the system requirements and present it in standard format.
	CO3	Apply key modeling concepts to both the traditional structured approach and the object oriented approach.
	CO4	Construct the candidate system for the required system.

Module No.	Topics	Ref.	Hrs.
1	Introduction System overview, Types of Systems, Key Differences Between Structured and Object -Oriented Analysis and Design, Role of the System Analyst, Systems Development Life Cycle	1,2,3	06
2	System Analysis Business process Reengineering and the Zachman Framework, System Requirement, Stakeholders, Techniques for information gathering, Validating the requirements.	1,2,3	06
3	Feasibility Analysis Feasibility Analysis, Tests for feasibility, CostBenefit Analysis, Feasibility analysis of candidate system, The system Proposal.	1,2,3	06
4	Modeling System Requirements Traditional Approach to Requirement: Data Flow Diagrams ,Documentation of DFD Components. Information Engineering Models, Object Oriented Approach to Requirement: Object Oriented Requirements, The System Activities, Identifying Input and Outputs, Identifying Object Behavior, Integrating Object Oriented Models, Evaluating Alternatives for requirements, Environment and	1,2,3	12



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

	Implementation		
5	System Design Moving To Design, The traditional Approach to design, The Object Oriented Approach to design: Use Case Realization, Designing Database, Designing the User Interface, Designing System Interfaces, Controls and security	1-11	12
6	Application Architecture IT Architecture, Application Architecture Strategies, Modeling, Application Architecture for Information System, Deployment using UML diagrams, Component and deployment diagram for various architectures.	1-11	06
Total			48

References:

- [1] Satzinger, Jackson and Burd, "System Analysis & Design" Cengage Learning, 2007
- [2] Jeffery I. Whitten, Lonnie D Bentley, "System Analysis and Design Methods", McGraw Hill, 7th edition.
- [3] Alan Dennis, Barbara H. Wixom, Roberta M. Roth, "System Analysis and Design", Wiley India 4th edition
- [4] Kendall & Kendall, "Systems Analysis and Design" PHI Publication, 7th Edition.
- [5] James a. Senn, "Analysis and Design of Information Systems", McGrawHill, 2nd Edition.
- [6] Michael Blaha, Jame Rumbaugh, "Object-Oriented Modeling and Design with UML" Pearson Education Publication, 2nd Edition.
- [7] Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language - User Guide" Pearson Education Publication.
- [8] Jeffrey A. Hoffer, Joey F. George, Joseph S. Valacich, Prabin K. Panigrahi, "Modern Systems Analysis and Design", Pearson Education Publication, 4th Edition.
- [9] UML Distilled by Martin Fowler, Pearson Edition, 3rd Edition.
- [10] Ali Bahrami, "Object Oriented Systems Development Using the Modified Modeling Language", Tata McGraw Hill Publication.
- [11] Applying UML and Patterns by Craig Larman, Pearson Education, 2nd Edition



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPC504	Computer Networks	4	-	--	4	-	--	4
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60% Weightage)		

Pre-requisite Course Codes	-
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At end of successful completion of this course, student will be able to

Course Outcomes	CO1	Conceptualize all the OSI Layers.
	CO2	Understand all the layer of TCP/IP Protocol Suite using the concepts of OSI Reference Model.
	CO3	Distinguish the components of Simple Network Management Protocol
	CO4	Investigate all the application layers protocols of TCP/IP Protocol Suite.

Module No.	Topics	Ref.	Hrs.
1	Introduction History and development of computer network, network application, network software and hardware components, topology, protocol hierarchies, design issues for the layers, connection oriented and connectionless services, reference models: layer details of OSI, TCP/IP models. Communication between layers.	1-7	06
2	Physical Layer Guided Transmission Media: Twisted pair, Coaxial, Fiber optics, Unguided media (Wireless Transmission): Radio Waves, Bluetooth, Infrared, and Virtual LAN.	1-7	06
3	Data Link Layer DDL Design Issues, Functionalities of DLL, Flow control algorithms, Sliding Window, Error Detection & Correction techniques, SDLC, PPP, and Framing. MAC Layer Aloha protocols, Control Access Protocol, Carrier Sense Multiple Access (CSMA), Ethernet, Local Area Networks -	1-7	09



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

	Ethernet, Token ring, FDDI.		
4	Network layer Communication Primitives: Unicast, Multicast, Broadcast. IP Addressing, Subnetting, IPv4, IPv6, Routing algorithms : Link state routing, Distance Vector Routing, ARP, RARP, ICMP, Routing protocols - RIP, OSPF, BGP, IGRP, Congestion control algorithms: Open Loop congestion control, Closed Loop congestion control.	1-7	08
5	Transport Layer The Transport Service: Transport service primitives, Berkeley Sockets, Connection management, UDP, TCP, Socket Programming (TCP & UDP), Socket Programming examples, TCP Flow control, TCP Congestion Control, Multiplexing.	1-7	08
6	Application Layer DNS, HTTP, E-mail, SMTP, Telnet, FTP, Security-GP-SSH.	1-7	06
7	Network Management SNMP Concept, Management Components, SMI, MIB, SNMP Format, Messages.	1-7	04
Total			48

References:

- [1] A.S. Tanenbaum, "Data Communications and Networking", Pearson Education, FOURTH Edition.
- [2] Behrouz Forouzan, "Data Communications and Networking", McGraw-Hill, FOUURTH Edition.
- [3] M. A. Gallo and W. M. Hancock, "Computer Communications and Networking Technologies", Cengage Learning (Indian Edition), FIRST Edition.
- [4] Natalia Olifer & Victor Olifer, "Computer Networks: Principles, Technologies & Protocols for Network Design", Wiley India, 2011.
- [5] Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", The Morgan Kaufmann Series in Networking.
- [6] James F. Kurose, Keith W. Ross, "Computer Networking", Pearson, SIXTH Edition.
- [7] Srinivasan Keshav, "An Engineering Approach To Computer Networking: Atm Networks, The Internet", Addison-Wesley Professional Computing Series.



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPL501	Web Technology Laboratory	--	--	4	--	--	2	2
		Examination Scheme						
		ISE		ESE			Total	
				Practical	Oral			
40		-		20		60		

Pre-requisite Course Codes	-
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At end of successful completion of this course, student will be able to

Course Outcomes	CO1	Design static client side web page using various html tags.
	CO2	Create web pages and use CSS to control the layout.
	CO3	Create an animation using Javascript.
	CO4	Create XML file.
	CO5	Create server side script using PHP.
	CO6	Develop Mini Project

Exp. No.	Experiment Details	Ref.	Marks
1	Design a static client side Web page using various HTML tags	1,2	5
2	Create a Web page and use CSS to control the layout pages	1,2	5
3	Create Dynamic HTML page using client side scripting	1,2	5
4	Design a Web page using any one web tool.	1,2	5
5	Create an XML file and use DTD to validate it.	1,2	5
6	Design a dynamic WEB page using server side scripting	1,2	5
7	Develop Mini Project	1,2	10
Total Marks			40

References:

[1] Ralph Moseley ,M.T. Savaliya “*Developing Web Applications*”, Willy India, Second Edition.

[2] JKogent Learning Solutions Inc, “*Web Technology Black Book*”, Dreamtech Press, First Edition



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
CPL502	Business Communication and Ethics	--	--	4	--	--	2	2	
		Examination Scheme							Total
		ISE		ESE		Total			
		50		Practical	Oral		50		

Pre-requisite Course Codes	-	
At end of successful completion of this course, student will be able to		
Course Outcomes	CO1	Communicate effectively in both verbal and written form and demonstrate knowledge of professional and ethical responsibilities
	CO2	Participate and succeed in Campus placements and competitive examinations like GATE, CET.
	CO3	Possess entrepreneurial approach and ability for life-long learning.
	CO4	Have education necessary for understanding the impact of engineering solutions on Society and demonstrate awareness of contemporary issues.

Module No.	Unit No.	Topics	Ref.	Hrs.
1		Report Writing		08
	1.1	Objectives of report writing		
	1.2	Language and Style in a report		
	1.3	Types of reports		
2		Technical Proposals		02
	2.1	Objective of technical proposals		
	2.2	Parts of proposal		
3		Introduction to Interpersonal Skills		08
	3.1	Emotional Intelligence		
	3.2	Leadership		
	3.3	Team Building		
	3.4	Assertiveness		
	3.5	Conflict Resolution		
	3.6	Negotiation Skills		
	3.7	Motivation		
3.8	Time Management			



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

4		Meetings and Documentation		02
	4.1	Strategies for conducting effective meetings		
	4.2	Notice		
	4.3	Agenda		
	4.4	Minutes of the meeting		
5		Introduction to Corporate Ethics and etiquettes		02
	5.1	Business Meeting etiquettes, Interview etiquettes, Professional and work etiquettes, Social skills		
	5.2	Greetings and Art of Conversation		
	5.3	Dressing and Grooming		
	5.4	Dinning etiquette		
	5.5	Ethical codes of conduct in business and corporate activities (Personal ethics, conflicting values, choosing a moral response, the process of making ethical decisions)		
6		Employment Skills		06
	6.1	Cover letter		
	6.2	Resume		
	6.3	Group Discussion		
	6.4	Presentation Skills		
	6.5	Interview Skills		
			Total	26

References:

- [1] Fred Luthans, "*Organizational Behavior*", Mc Graw Hill, edition
- [2] Huckin and Olsen, "*Technical Writing and Professional Communication*", Mc Graw Hill
- [3] Wallace and Masters, "*Personal Development for Life and Work*", Thomson Learning, 12th edition
- [4] Heta Murphy, "*Effective Business Communication*", Mc Graw Hill, edition
- [5] B N Ghosh, "*Managing Soft Skills for Personality Development*", Tata McGraw
- [6] Bell . Smith, "*Management Communication*" Wiley India Edition, 3rd edition.
- [7] Dr.K.Alex , "*Soft Skills*", S Chand and Company



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPCL501	Microprocessor Lab	--	--	2	--	--	1	1
		Examination Scheme						
		ISE		ESE		Total		
				Practical	Oral			
40		20		-	60			

Pre-requisite Course Codes	CPC501(Microprocessor)	
At end of successful completion of this course, student will be able to		
Course Outcomes	CO1	Create assembly language for 8086 based system.
	CO2	Create mixed language programs for 8086 based system.
	CO3	Use interrupt structure of 8086.
	CO4	Illustrate use of various addressing modes of 8086
	CO5	Use interfacing applications of peripheral controllers with 8086 microprocessor.

Exp. No.	Experiment Details	Ref.	Marks
1	Program using data transfer instructions.	1,2,4	5
2	Program to study flag operation in 8086.	1,2,4	5
3	Program using arithmetic instruction.	1,2,4	5
4	Program using logical instructions.	1,2,4	5
5	Program using subroutines.	1,2,4	5
6	Program using various addressing modes.	1,2,4	5
7	Peripheral interfacing applications.	1,3	5
8	Interfacing of 8086 with peripheral chips like 8255	1,3	5
Total Marks			40

References:

- [1] Douglas Hall, "Microprocessor and Interfacing", Tata McGraw Hill.
- [2] John Uffenbeck, "8086/8088 family: Design Programming and Interfacing", PHI.
- [3] Liu & Gibson, "Microcomputer Systems: 8086/8088 family Architecture, Programming and Design", PHI Publication.
- [4] Barry B. Brey, "Intel Microprocessors", Pearson Education India, 8th Edition.



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPCL502	Operating System Lab	--	--	2	--	--	1	1
		Examination Scheme						
		ISE		ESE			Total	
				Practical	Oral			
40	20	-		60				

Pre-requisite Course Codes	CPC502(Operating System)
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At end of successful completion of this course, student will be able to

Course Outcomes	CO1	Compare performance of various CPU scheduling algorithm.
	CO2	Demonstrate deadlock detection and avoidance algorithm.
	CO3	Create processes and implement IPC
	CO4	Demonstrate file and memory allocation strategies.
	CO5	Demonstrate process synchronization.
	CO6	Develop mini project

Exp. No.	Experiment Details	Ref.	Marks
1	Implement CPU scheduling algorithm.	1,2	5
2	Implement Producer consumer problem using Semaphore.	1,2,3	5
3	Implement bankers algorithm for deadlock avoidance.	1,2	5
4	Implement threading and synchronization application.	1,2,3	5
5	Implement system calls for mv,cp.	4,5	5
6	Implement disk scheduling algorithm	1,2	5
7	BIOS CMOS and BOOT process : Study BIOS setting security	4,5	5
8	Develop Mini Project	1,2,3	5
Total Marks			40

References:

- [1] Silberschatz A., Galvin P., Gagne G. "Operating Systems Principles", Willey Eight edition
- [2] William Stallings, "Operating System-Internal & Design Principles", Pearson
- [3] Andrew S. Tanenbaum, "Modern Operating System", Prentice Hall.
- [4] Maurice J. Bach, "The Design of Unix Operating System", Prentice Hall.
- [5] B. M. Harwani, "Unix and Shell Programming", Oxford



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
CPCL503	Structured and Object Oriented Analysis and Design Lab	--	--	2	--	--	1	1	
		Examination Scheme							Total
		ISE		ESE		Total			
		40		-			20	60	

Pre-requisite Course Codes	CPC503(Structured and Object Oriented Analysis and Design)		
At end of successful completion of this course, student will be able to			
Course Outcomes	CO1	To write, gather and validate requirement of a system.	
	CO2	To create a model of requirements using structured approach.	
	CO3	To create a model of requirements using object oriented approach.	
	CO4	To demonstrate a system prototype derived from requirement modeling.	

Exp. No.	Experiment Details	Ref.	Marks
1	To document System Requirement Specification	1,2,3	5
2	To draw DFD for a given scenario	1,2,3	5
3	To draw Class Diagram for a given scenario	1,2,3	5
4	To draw use case diagram along with specification for a given scenario	1,2,3	5
5	To draw communication diagram for a given scenario	1,2,3	5
6	To draw state machine and workflow diagram for a given scenario	1,2,3	5
7	To draw component and Deployment diagram for a given scenario	1,2,3	5
8	Mini-project	1-11	5
Total Marks			40

References:

- [1] Satzinger, Jackson and Burd, "System Analysis & Design" Cengage Learning, 2007
- [2] Jeffery I. Whitten, Lonnie D Bentley, "System Analysis and Design Methods", McGraw Hill, 7th edition.



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

- [3] Alan Dennis, Barbara H. Wixom, Roberta M. Roth, "System Analysis and Design", Wiley India 4th edition
- [4] Kendall & Kendall, "Systems Analysis and Design" PHI Publication, 7th Edition.
- [5] James a. Senn, "Analysis and Design of Information Systems", McGrawHill, 2nd Edition.
- [6] Michael Blaha, Jame Rumbaugh, "Object-Oriented Modeling and Design with UML" Pearson Education Publication, 2nd Edition.
- [7] Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language - User Guide" Pearson Education Publication.
- [8] Jeffrey A. Hoffer, Joey F. George, Joseph S. Valacich, Prabin K. Panigrahi, "Modern Systems Analysis and Design", Pearson Education Publication, 4th Edition.
- [9] UML Distilled by Martin Fowler, Pearson Edition, 3rd Edition.
- [10] Ali Bahrami, "Object Oriented Systems Development Using the Modified Modeling Language", Tata McGraw Hill Publication.
- [11] Applying UML and Patterns by Craig Larman, Pearson Education, 2nd Edition



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
CPCL504	Computer Networks Lab	--	--	2	--	--	1	1	
		Examination Scheme							Total
		ISE		ESE		-			
		40		Practical	Oral		20	60	

Pre-requisite Course Codes	CPC504 (Computer Networks)
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At end of successful completion of this course, student will be able to

Course Outcomes	CO1	Acquire the ns2 to simulate the network protocols.
	CO2	Use appropriate network tools to build network topologies
	CO3	Test simple protocols in a laboratory scenario.
	CO4	Implement Application layer network protocols.

Exp. No.	Experiment Details	Ref.	Marks
1	Study of i) ns2 network simulator and its Installation over Linux OS and ii) Graph Theory for computer network.	1,2	5
2	Study all network topologies viz. Bus, Star, Ring and Mesh etc. and their simulation using ns2 simulator.	1,2	5
3	Simulate Stop and Wait Protocol using ns2 simulator for the given scenario.	1,2	5
4	Simulate Sliding Window Protocol using ns2 simulator for the given scenario.	1,2	5
5	Write a C/C++ program for the simulation of Cyclic Redundancy Check and Hamming codes for the given scenario.	1,2	5
6	Simulate Link state routing protocol in C/C++ language for the given scenario.	1,2	5
7	Simulate Distance vector routing protocol in C/C++ language for the given scenario.	1,2	5
8	Implement the following two application servers: a) A tinny FTP server (tftpserver) which accepts a connection from a client program (cftp). It accepts upto 5 connection simultaneously. It supports only three basic operations. viz. i) get <source><destination> ii) put <source><destination>	1,2	5



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

	iii) quit. b) A web server using HTTP protocol for Name-based virtual hosting for the given scenario.		
Total Marks			40

References:

- [1] A.S. Tanenbaum, "*Data Communications and Networking*", Pearson Education, FOURTH Edition.
- [2] Behrouz Forouzan, "*Data Communications and Networking*", McGraw-Hill, FOUURTH Edition.
- [3] M. A. Gallo and W. M. Hancock, "*Computer Communications and Networking Technologies*", Cengage Learning (Indian Edition), FIRST Edition.
- [4] Natalia Olifer & Victor Olifer, "*Computer Networks: Principles, Technologies & Protocols for Network Design*", Wiley India, 2011.
- [5] Larry L. Peterson, Bruce S. Davie, "*Computer Networks: A Systems Approach*", The Morgan Kaufmann Series in Networking.
- [6] James F. Kurose, Keith W. Ross, "*Computer Networking*", Pearson, SIXTH Edition.
- [7] Srinivasan Keshav, "*An Engineering Approach To Computer Networking: Atm Networks, The Internet*", Addison-Wesley Professional Computing Series.

Semester VI

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPC601	System Programming and Compiler Construction	4	-	--	4	-	--	4
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60% Weightage)		

Pre-requisite Course Codes	CPC502 (Operating System)
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At end of successful completion of this course, student will be able to

Course Outcomes	CO1	To understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger.
	CO2	To understand concepts of assemblers and write macros as and when required to increase readability and productivity.
	CO3	To understand the various phases of compiler and working of parsers.
	CO4	To understand role of Intermediate Code Generation in connection with language designing and apply optimization principles on given code.
	CO5	To analyze the role of Operating System functions such as memory management as pertaining to run time storage management.

Module No.	Topics	Ref.	Hrs.
1	System Software Concept, introduction to various system programs such as assemblers, loaders, linkers, macro processors, compilers, interpreters, operating systems, device drivers	1-5	01
2	Assemblers General Design Procedure, Design of Assembler (Single Pass –Assembler IBM PC, multi pass Assembler - IBM 360/370 Processor), Statement of Problem, Data Structure, format of Databases, Algorithm, Look for modularity	1-5	06
3	Macros & Macro processors Macro instructions, Features of Macro facility, Design of 2 pass macro processor	1-5	04
4	Loaders and Linkers Loader schemes, Design of Absolute loader, Design of Direct linking Loader	1-5	04
5	Software Tools Software Tools for Program development, Editors: Types of	1-5	02



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

	Editors, Design of Editor, Debug Monitors		
6	Compilers Introduction to Compilers, Phases of a compiler, comparison of compilers and interpreters.	1-5	02
7	Lexical Analysis Role of a Lexical analyzer, input buffering, specification and recognition of tokens, Designing a lexical analyzer generator, Pattern matching based on NFA's.	1-5	02
8	Syntax Analysis Role of Parser, Top down parsing, Recursive descent and predictive parsers (LL), Bottom Up parsing, Operator precedence parsing, LR, SLR and LALR parsers.	1-5	08
9	Syntax Directed Translation Syntax directed definitions, Inherited and Synthesized attributes, Evaluation order for SDDs, S attributed Definitions, L attributed Definitions	1-5	03
10	Intermediate Code Generation Intermediate languages: declarations, Assignment statements, Boolean expression, case statements, back patching, procedure calls.	1-5	04
11	Code Generation Issues in the design of Code Generator, Basic Blocks and Flow graphs, code generation algorithm, DAG representation of Basic Block	1-5	04
12	Code Optimization Principal sources of Optimization, Optimization of Basic Blocks, Loops in Flow graph, Peephole Optimization	1-5	03
13	Run Time storage Storage Organization, storage allocation strategies, parameter passing, Symbol table, introduction to garbage collection and compaction	1-5	04
14	Compiler-compilers JAVA compiler environment, YACC compiler-compiler	1-5	01
Total			48

References:



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

- [1] J. J Donovan, "Systems Programming", Tata McGraw Hill Publishing Company
- [2] A. V. Aho, R. Shethi and J.D. Ulman, "Compilers - Principles, Techniques and Tools", Pearson Education
- [3] A. V. Aho, R. Shethi, Monica Lam, J.D. Ulman "Compilers - Principles, Techniques and Tools", Pearson Education, Second Edition.
- [4] D. M Dhamdhere, "Systems programming", Tata McGraw Hill
- [5] John R. Levine, Tony Mason & Doug Brown, "lex&yacc", O'Reilly, 2nd Edition



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPC602	Software Engineering	4	-	--	4	-	--	4
		Examination Scheme						
		ISE		MSE		ESE		
		10	30	100 (60% Weightage)				

Pre-requisite Course Codes	CPC503 (Structured and Object-Oriented Analysis and Design)	
At end of successful completion of this course, student will be able to		
Course Outcomes	CO1	Plan, design, develop and validate software project.
	CO2	Apply estimation and scheduling techniques.
	CO3	Analyze and mitigate risks in software project.
	CO4	Apply advance software methodology to create high quality WebApps.

Module No.	Topics	Ref.	Hrs.
1	Introduction Software Engineering Process Paradigms, Process Models – Incremental and Evolutionary models, Typical Application for each model, Agile methodology, Process and Project Metrics.	1-6	06
2	Software project scheduling, Control & Monitoring Software estimation – Empirical estimation models -Cost/Effort estimation Planning – Work breakdown Structure, Gantt Chart. Discuss schedule and cost slippage.	1-6	04
3	Risk Management Risk Identification, Risk Assessment, Risk Projection, RMMM	1-6	04
4	Software Configuration Management Software Configuration items, SCM process, Identification of objects in software configuration, version and change control, configuration audit, status reporting, SCM standards and SCM issues.	1-6	04
5	Software Design Specification Software Design – Abstraction, Modularity Software Architecture – Effective modular design, Cohesion and Coupling, Example of code for cohesion and coupling, User Interface Design – Human Factors, Interface	1-6	08



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

	standards, DesignIssues – User Interface Design Process.		
6	Software Quality Software Quality Assurance – Software standards , Quality metrics Software Reliability ,QualityMeasurement and Metrics	1-6	04
7	Software Testing Basic concept and terminology, Verification & validation, White BoxTesting- Path Testing, Control Structures Testing , DEF-USE testing,Black Box Testing –BVA Integration, Validation and system testing, OO testing methods-Class Testing, Interclass testing, testing architecture, Behavioral testing, Software Maintenance – Reverse Engineering.	1-6	12
8	Web Engineering For web based applications – attributes, analysis and design, testing, Security Engineering, Service-Oriented Software Engineering, Test Driven Development, Software engineering with aspects	1-6	06
Total			48

References:

- [1] Roger Pressman, Software Engineering: A Practitioners Approach, (6th Edition), McGraw Hill, 2010
- [2] Ian Somerville, Software Engineering, 9th edition, Addison Wesley, 2011
- [3] Eric J. Braude and Micheal E. Bernstein, Software Engineering Modern Approach, 2nd edition, Wiley, 2011.
- [4] Ali Behforooz Fredrick Hudson, Software Engineering Fundamentals, Oxford University Press, 2006.
- [5] James F. Peters and Witold Pedrycz, “ Software Engineering – An Engineering Approach”, Wiley.
- [6] Mouratidis and Giorgini. “Integrating Security and Software Engineering – Advances and Future”, IGP. ISBN – 1-59904-148-0



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPC603	Distributed Database	4	-	--	4	-	--	4
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60% Weightage)		

Pre-requisite Course Codes	CSC404 (Database Management System)
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At end of successful completion of this course, student will be able to

Course Outcomes	CO1	Students can understand the principles and foundations of distributed databases.
	CO2	Students can design and implement distributed database for enterprise applications using fragmentation and allocation concepts
	CO3	Students can learn the distributed transaction management and concurrency control in distributed databases using different algorithms.
	CO4	Student can understand deadlock handling and database recovery in distributed environment.
	CO5	Student can understand the query processing and optimization and also to learn the Architecture of Heterogeneous Database.
	CO6	To learn the integration of schemas using XML.

Module No.	Topics	Ref.	Hrs.
1	Concept and Overview Distributed Database system What is Distributed Database System (DDBS), Features of DDBS, promises of DDBS, Design issue in DDBS, Distributed DBMS architecture: Client/server System, Peer-to-Peer, Mutli-Databasesystem.	1-5	08
2	Distributed Database Design Distributed database design concept, objective of Data Distribution, Data Fragmentation, The allocation of fragment, Transparencies in Distributed Database Design	1-5	08
3	Distributed Transaction and concurrency control Basic concept of Transaction management, objective Distributed transaction management, Model for Transaction management, Distributed Concurrency control: Objective, concurrency	1-5	08



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

	control anomalies, Distributed Serializability, Locking based algorithm, Timestamp based algorithm.		
4	Distributed Deadlock and Recovery Introduction to Deadlock, Distributed Deadlock prevention, avoidance, detection and recovery, Two-Phase and Three-Phase Commit Protocol.	1-5	06
5	Distributed query processing and optimization Concept, objective, and phases of distributed query processing; join strategies in fragment relation, Global query optimization	1-5	04
6	Heterogeneous Database Architecture of Heterogeneous Database, Database Integration: Schema Translation and schema Integration, Query processing issues in Heterogeneous database.	1-5	06
7	XML XML for data integration, structure of XML, XML document schema, Querying and Transformation, storage of XML data, XML application.	1-5	08
Total			48

References:

- [1] ChhandaRay, "Distributed Database System", Pearson Education India.
- [2] A. Silberschatz, H. Korth, "Database System", Six Edition, Mc-Graw Hill.
- [3] Seed K. Rahimi and Frank S. Haug, "Distributed Database Management System", Wiley India.
- [4] M. Tamer Ozsu, Patrick Valduriez, "Principles of Distributed Database", Pearson Education India.
- [5] Elmasri and Navathe, "Fundamentals of Database Systems", 6th Edition, Pearson Education India.



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPC604	Mobile Communication and Computing	4	-	--	4	-	--	4
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60% Weightage)		

Pre-requisite Course Codes	-
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At end of successful completion of this course, student will be able to

Course Outcomes	CO1	To Understand GSM and CDMA Cellular architecture.
	CO2	To Setup and configure wireless access points.
	CO3	To Use Network Simulator tool to simulate mobile network.
	CO4	To Implement small android based applications.
	CO5	To understand the concept of Satellite Communication

Module No.	Topics	Ref.	Hrs.
1	Introduction to Mobile Computing Wireless Communication, Applications, Cellular Systems, Antennas,satellite system, GEO, LEO, MEO, GPRS:-Architecture, Network nodes,GPRS support nodes.	1.2	05
2	GSM cellular telephony-architecture and system aspects Introduction, Basic GSM architecture, Basic radio transmissionparameters of the GSM system, Logical channel description, GSM timehierarchy, GSM burst structures, Description of the call set-up procedure,Handover, Ensuring privacy and authentication of a user, Modificationsand derivatives of GSM	1.2	08
3	Mobile Network Mobile IP, IP Packet Delivery, Agent Advertisement and Discovery,Registration, Tunnelingand Encapsulation,Optimization,ReverseTunneling,Mobile TCP, Fast Retransmit/ Fast Recovery,Transmission/Timeout Freezing, Selective Retransmission.	1.2	06
4	Third and Fourth Generation Systems W-CDMA, CDMA 2000; Improvements on Core Networks; Quality of	1.2	06



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

	Services in 3G ; Wireless Local Loop; Wireless Local Loop Architecture; Deployment Issues; TR-45 Service Description; Wireless Local Loop technologies. TETRA, UMTS and IMT-2000;UMTS Basic Architecture, UTRA FDD mode, UTRA TDD mode, 4G Architecture, Comparison between 3G and 4G.		
5	Mobility Management Co- channel Interference, Mobility: Types of Handoffs; LocationManagement, HLR-VLR scheme, Hierarchical scheme, PredictiveLocation management schemes, cellular IP, PSTN.	1,2,3	04
6	Wireless Local Area Networks Introduction, Types of WLANs, Hidden station problem, HIPERLANType 1: HIPERLAN/1 MAC sublayer, HIPERLAN/1 CAC layer, HIPERLAN/1 physical layer. IEEE 802.11 WLAN standards: IEEE802.11 physical layer, IEEE 802.11 MAC sublayer. IEEE 802.11 andHIPERLAN standards for 5 GHz band: HIPERLAN/2 physical layer,HIPERLAN /2 data link control layer. Bluetooth: Introduction, UserScenario, Architecture, protocol.	1,2	08
7	Introduction to Android Layers, android components, mapping application to process. Android development basics. Hardware tools, Software tools, Android SDKfeatures	3,11	05
8	Security Issues In Mobile Computing Security Issues, Authentication, Encryption, Cryptographic Tools: Hash, Message Authentication Code (MAC), Digital Signature, Certificate. Secure Socket Layer (SSL). Characteristics of SIM, Equipment Identification.	1,10	06
Total			48

References:

- [1] Jochen Schiller ,”Mobile Communication “, Addison wisely,Pearson Education
- [2] Krzysztof Wesolowski, “Mobile Communication Systems”, Wiley publication
- [3] W. Frank Ableson,Robi sen, Chris King, “ Android In Action “, Third Edition, Dreamtech Press
- [4] Mobile Computing By Rajkamal (Oxford).
- [5] Uwe Hansmann, Lothar Merk, Martin S. Nicklous, Thomas Stober, “Principles of Mobile Computing”, Springer
- [6] Rappaort, “Wireless Communications Principles and Practices”
- [7] Yi Bang Lin, “Wireless and Mobile Network Architecture”, John Wiley
- [8] P. Nicopolitidis, “Wireless Networks”, John Wiley
- [9] K. Pahlavan, P.Krishnamurthy, “Principles of Wireless Networks”



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
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- [10] Introduction to Wireless Telecommunication System and Networks by Mullet (Cengage Learning).
- [11] Beginning for Android 4 Application Development By Wei- Meng Lee, Wiley –India Edition.



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPE6011	Elective-IOperations Research	-	-	2+2*	-	-	2	2
		Examination Scheme						
		ISE	ESE		Total			
			Practical	Oral				
50	-	-	50					

Pre-requisite Course Codes	(Applied Mathematics)	
At end of successful completion of this course, student will be able to		
Course Outcomes	CO1	Model and solve problem using linear programming techniques
	CO2	Implement algebraic solution using simplex method
	CO3	Define transportation model and apply transportation algorithm in a known situation.
	CO4	Use montecarlo simulation technique.
	CO5	Use the spreadsheet as a tool effectively for OR topics

Module No.	Topics	Ref.	Hrs.
1	What is Operations Research Introduction.	1, 2	02
2	Modeling with Linear Programming Two-Variable LP Model Graphical LP Solution Solution of a Maximization Model Solution of a Minimization Model Computer Solution with Solver and AMPL LP solution with Excel Solver LP Solution with AMPL Linear Programming Applications Investment Product Planning and Inventory Control Manpower Planning Urban Development Planning Blending and Refining Additional LP Applications	1, 2	07



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

3	The Simplex Method and Sensitivity Analysis LP Model in Equation Form Transition from Graphical to Algebraic Solution The Simplex Method Iterative Nature of the Simplex Method Computational details of the Simplex algorithm Summary of the Simplex Method Artificial Starting Solution M-Method Two-Phase Method Special Cases in the Simplex Method Degeneracy Alternative Optima Unbounded Solution Infeasible Solution Sensitivity Analysis Graphical Sensitivity Analysis Algebraic Sensitivity Analysis – Changes in the Right-hand side Algebraic Sensitivity Analysis – Objective function Sensitivity Analysis with Tora, Solver, and Ampl Computational issues in Linear Programming	1, 2	06
4	Duality and Post-Optimal Analysis Definition of the Dual Problem Primal-Dual Relationships Review of Simplex Matrix Operations Simplex Tableau Layout Optimal Dual Solution Simplex Tableau Computations Economic Interpretation of Duality Economic Interpretation of Dual Variables Economic Interpretation of Dual Constraints Additional Simplex Algorithms Dual Simplex Algorithm Generalized Simplex Algorithm	1, 2	05
5	Transportation Model and Its Variants Definition of the Transportation Model Nontraditional Transportation Models The Transportation Algorithm Determination of the Starting Solution	1, 2	05



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
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	Iterative Computations of the Transportation Algorithm Simplex Method Explanation of the Method of Multipliers The Assignment Model The Hungarian Method Simplex Explanation of the Hungarian Method		
6	Decision Analysis Decision Making under Certainty – Analytic Hierarchy Process (AHP) Decision Making under Risk Decision Tree-Based Expected Value Criterion Variants of the Expected Value Criterion Decision under Uncertainty	1, 2	03
7	Stimulation Modeling Monte Carlo Simulation Types of Simulation Elements of Discrete Event Simulation Generic Definition of Events Sampling from Probability Distributions	1, 2	02
8	Nonlinear Programming Algorithms Unconstrained Algorithms Direct Search Method Gradient Method Constrained Algorithms Separable Programming Quadratic Programming	1, 2	03
9	Introduction to spreadsheet model	1, 2	02
		Total	35

References:

- [1] Taha, Hamdy A. "Operations Research" Pearson, 2011.
- [2] N.D. Vhora "Quantitative Techniques in Management" TMH , 3rd edition



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPE6012	Elective-ISoftware Project Management	-	-	2+2*	-	-	2	2
		Examination Scheme						
		ISE	ESE		Total			
			Practical	Oral				
50	-	-	50					

Pre-requisite Course Codes	CPC602 (Software Engineering)
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At end of successful completion of this course, student will be able to

Course Outcomes	CO1	To define characteristics of a project.
	CO2	To appreciate project management principles, risk in environment and the management challenges for effective project management.
	CO3	To apply the project management principles across all phases of a project.
	CO4	To demonstrate use of tools and techniques for the management of a project plan, monitor and controlling a project schedule and budget, tracking project progress

Module No.	Topics	Ref.	Hrs.
1	An overview of IT Project Management Introduction, the state of IT project management, context of project management, need of project management, project goals, project lifecycle and IT development, extreme project management, PMBOK.	1-11	02
2	Conceptualizing and Initializing the IT Project An information technology project methodology (ITPM), project feasibility, request for proposal (RFP), the business case, project selection and approval, project contracting, IT governance and the project office.	1-11	04
3	The Human Side of Project Management Introduction, organization and project planning, the project team, the project environment.	1-11	02
4	Developing the Project Charter and Project Plan Introduction, project management process, project integration management, the project charter, project planning framework, the contents of a project plan, the planning process, The Work Breakdown Structure (WBS), the linear responsibility chart, multidisciplinary teams.	1-11	04



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

5	The Scope Management Plan Introduction, scope planning, project scope definition, project scope verification, scope change control.	1-11	04
6	The Project is Schedule, Budget and Risk Management Introduction, developing the project schedule, project management, software tools, methods of budgeting, developing the project budget, improving cost estimates, finalizing the project schedule and budget. IT project risk management planning process, identifying IT project risks, risk analysis and assessment, risk strategies, risk monitoring, and control, risk responses and evaluation.	1-11	08
7	Allocating Resources to the Project Resource loading, resource leveling, allocating scarce resources to projects and several projects, Goldratt's critical chain.	1-11	03
8	The Project Communication Plan Introduction, monitoring and controlling the project, the project communications plan, project metric, project control, designing the control system, the plan-monitor-control cycle, data collection and reporting, reporting performance and progress, information distribution.	1-11	02
9	Managing Change, Resistance and Conflicts	1-11	02
10	Managing Project Procurement and Outsourcing Introduction, project procurement management, outsourcing.	1-11	02
11	Project Leadership and Ethics Introduction, project leadership, ethics in projects, multicultural projects.	1-11	01
12	The Implementation Plan and Project Closure Introduction, project implementation, administrative closure, project evaluation, project audit.	1-11	02
Total			36

References:

- [1] Jack T. Marchewka, "Information Technology Project Management", Wiley India, 3rd edition, 2009.
- [2] S. J. Mantel, J. R. Meredith and etl.. "Project Management" 1st edition, Wiley India 2009
- [3] John M. Nicholas, "Project Management for Business and Technology", 2nd edition, Pearson Education.
- [4] Joel Henry, "Software Project Management, A real-world guide to success", Pearson Education, 2008.
- [5] Gido and Clements, "Successful Project Management", 2nd edition, Thomson Learning.
- [6] Hughes and Cornell, "Software Project Management", 3rd edition, Tata McGraw Hill
- [7] Joseph Phillips, "IT Project Management", 2nd edition, Tata McGraw Hill
- [8] Robert K. Wysocki and Rudd McGary, "Effective Project Management", 3rd edition, Wiley



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

- [9] Brown, K.A. Project Management, McGraw Hill, 2002.
- [10] E-Book – Project Management Body of Knowledge.
- [11] Dinsmore, P. C. (Ed.). (1993) The AMA Handbook of Project Management. AMACOM



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
CPE6013	Elective-IGerman	-	-	2+2*	-	-	2	2	
		Examination Scheme							Total
		ISE	ESE		Total				
			Practical	Oral					
	50	-	-	50					

Pre-requisite Course Codes	-	
At end of successful completion of this course, student will be able to		
Course Outcomes	CO1	Construct grammatically correct German sentences
	CO2	Extend the German vocabulary
	CO3	Use proper pronunciation and phonetics while communicating
	CO4	Write and read German in efficient manner

Module No.	Topics	Ref.	Hrs.
1	Basic Grammar, pronunciation and basic expression	1,2	08
2	Communication Greetings , beginning of conversation, Introduction of oneself , numbers , counting and dates	1,2	08
3	Reading , Comprehension and writing - (Type of Text) Dialogs, Monologs , Biodata,	1,2	05
4	Family Structures Culture Computer and Multimedia Work culture	1,2	10
5	Corporate communication Emails , Technical Reports , Making presentations	1,2	05
Total			28

References:

- [1] German Conversation Demystified with Two Audio CDs / Edition by Ed Swick
- [2] German Conversational: Learn to Speak and Understand French with Pimsleur Language Programs Audio CD – Audiobook by Pimsleur



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
CPE6014	Elective-IFrench	-	-	2+2*	-	-	2	2	
		Examination Scheme							Total
		ISE		ESE		Total			
				Practical	Oral				
		50	-	-	-	-	50		

Pre-requisite Course Codes	-		
At end of successful completion of this course, student will be able to			
Course Outcomes	CO1	Construct grammatically correct French sentences	
	CO2	Extend the French vocabulary	
	CO3	Use proper pronunciation and phonetics while communicating	
	CO4	Write and read French in efficient manner	

Module No.	Topics	Ref.	Hrs.
1	Basic Grammar, pronunciation and basic expression	1,2	08
2	Communication Greetings , beginning of conversation, Introduction of oneself , numbers , counting and dates	1,2	08
3	Reading , Comprehension and writing - (Type of Text) Dialogs, Monologs , Biodata,	1,2	05
4	Family Structures Culture Computer and Multimedia Work culture	1,2	10
5	Corporate communication Emails , Technical Reports , Making presentations	1,2	05
Total			28

References:

- [1] French Conversational: Learn to Speak and Understand French with Pimsleur
- [2] Language Programs Audio CD – Audiobook by Pimsleur



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
CPL601	Networking Programming Laboratory	--	--	4	--	--	2	2	
		Examination Scheme							Total
		ISE		ESE			Total		
				Practical	Oral				
		40	-		20		60		

Pre-requisite Course Codes	CPC504 (Computer Networks)	
At end of successful completion of this course, student will be able to		
Course Outcomes	CO1	Configure Linux Network, View and edit routing tables.
	CO2	Configure Linux FTP server, DNS server and web server.
	CO3	Implement Sockets programming and understand TCP/IP.
	CO4	Provide and appreciate security features for network.

Exp. No.	Experiment Details	Ref.	Marks
1	A. Study of Networking Commands (Ping, Tracert, TELNET, nslookup, netstat, ARP, RARP) and Network Configuration. B. Linux Network Configuration. Determining IP Address and MAC Address using ifconfig command. <ol style="list-style-type: none"> Configuring NIC's IP Address Changing IP Address using ifconfig. Static IP Address and Configuration by Editing. Determining IP Address using DHCP. Configuring Hostname in /etc/hosts file. 	1	5
2	Linux Networking Commands. <ol style="list-style-type: none"> Using netstat and route commands to do the following. <ol style="list-style-type: none"> View current routing table. Add and delete routes. Change default gateway. Configuring remote login Services, telnet & ssh. Configuring IPTables. 	1	5
3	A. To configure Linux FTP server using VSFTPD. <ol style="list-style-type: none"> Set up anonymous access of FTP server. Enable individual logins and add FTP users with Read only access. Transfer Files. 	2	5



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

	B. To install and configure web server.		
4	To install and configure DNS server.	2,3	5
5	To implement chat server in C language.	4	5
6	To implement port scanner in C or Python language.	5	5
7	Mini Project		10
Total Marks			40

References:

- [1] Olaf Kirch & Terry Dawson, "Linux Network Administrator's Guide" 2nd Edition June 2000.
1-56592-400-2.
- [2] <https://help.ubuntu.com/lts/serverguide/serverguide.pdf>
- [3] <https://help.ubuntu.com/lts/serverguide/dns.html>
- [4] Michael J. Donahoo, "TCP/IP Sockets in C: Practical Guide for Programmers", Second Edition
- [5] William Stallings, "Cryptography and Network Security Principles and Practices", Fourth Edition.



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPCL601	System Programming and Compiler Construction Lab	--	--	2	--	--	1	1
		Examination Scheme						
		ISE		ESE			Total	
				Practical	Oral			
40		20		-		60		

Pre-requisite Course Codes	CPC601 (System Programming and Compiler Construction)
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At end of successful completion of this course, student will be able to

Course Outcomes	CO1	To use Flex or similar tools to create a lexical analyzer and Yacc/Bison tools to create a parser.
	CO2	To implement different types of handwritten parsers.
	CO3	To implement the working of assembler and Macros.
	CO4	To demonstrate linkers and loaders.

Exp. No.	Experiment Details	Ref.	Marks
1	Lex program to generate tokens (identifiers, keywords, operators, delimiters, etc.) for Java Programming language. Program should generate at least 50 tokens and it should recognize unique identifiers.	1	5
2	Program to remove left recursion for the given grammar. Program should accept the grammar from user, detect left recursion and eliminate it by generating a new non-terminal.	3,4	5
3	Implement Predictive Parser for the given grammar.	3,4	5
4	Program to find first and follow sets for the given grammar. Program should accept the grammar from user and output the first and follow sets for each of the grammar symbol.	3,4	5
5	Program to generate Quadruple table for the given postfix String	3,4	5
6	Implement two pass Assembler for IBM 360/370 machine. The input is a source consisting of syntactically correct IBM 360/370 statement. The output should display all tables and their values. The final output is an object file of small subset of instructions.	2	5
7	Implement MACRO Assembler for IBM 360/370 for the feature "Conditional MACRO expansion".	2	5
8	Create user defined library in open source environment and use it for		5



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

particular functions.		
	Total Marks	40

References:

- [1] John R. Levine, Tony Mason & Doug Brown O'Reilly, "*lex & yacc*", 2nd Edition
- [2] J. J Donovan, "Systems Programming" Tata McGraw Hill Publications.
- [3] A. V. Aho, R. Shethi and J.D. Ulman, "Compilers Principles, Techniques and Tools" ,
Pearson Education
- [4] A. V. Aho, R. Shethi, Monica Lam , J.D. Ulman, "Compilers Principles, Techniques and
Tools", Pearson Education, Second Edition.



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPCL602	Software Engineering Lab	--	--	2	--	--	1	1
		Examination Scheme						
		ISE		ESE			Total	
				Practical	Oral			
40		--	20		60			

Pre-requisite Course Codes	CPC602 (Software Engineering)
At end of successful completion of this course, student will be able to	
Pre-requisite Course Codes	-
Course Outcomes	CO1 Select process model for a given problem.
	CO2 Plan, design, develop and validate software project.
	CO3 Apply estimation and scheduling techniques.
	CO4 Analyze and mitigate risks in software project.
	CO5 Apply advance software methodology to create high quality Web Apps.

Exp. No.	Experiment Details	Ref.	Marks
1	Create SRS in IEEE format for a case study.	1,2,3	5
2	Apply process model to a case study.	1,2,3	5
3	Create Work Breakdown Structure and schedule using project management tool for the case study.	1,2,3	5
4	Estimation using function point.	1,2,3	5
5	Develop test plan. (Acceptance test plan, White box test cases)	1,2,3	5
6	Risk estimation.	1,2,3	5
7	Automated testing using testing tool.	1,2,3	5
8	Mini Project.	1,3,4	5
Total Marks			40

References:

- [1] Roger Pressman, Software Engineering: A Practitioners Approach, (6th Edition), McGraw Hill, 2010.
- [2] Ian Somerville, Software Engineering, 9th edition, Addison Wesley, 2011
- [3] Eric J. Braude and Micheal E. Bernstein, Software Engineering Modern Approach, 2nd edition, Wiley, 2011.



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

[4] Ali Behforooz Fredrick Hudson, Software Engineering Fundamentals, Oxford University Press, 2006.



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPCL603	Distributed Databases Lab	--	--	2	--	--	1	1
		Examination Scheme						
		ISE		ESE			Total	
				Practical	Oral			
40		-		20		60		

Pre-requisite Course Codes	CPC603 (Distributed Databases)
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At end of successful completion of this course, student will be able to

Course Outcomes	CO1	To understands fragmentation concepts practically.
	CO2	To analyze best algorithm for concurrency control
	CO3	To create and parse XML Documents
	CO4	To gain knowledge of actual Query Processing , optimization and Deadlock detection

Exp. No.	Experiment Details	Ref.	Marks
1	Perform Fragmentation (PHF, DHF, VF, and HF) and allocation in DDBS design.	1,4	5
2	Case study on Concurrency control algorithms	1,3,4	5
3	Creating an XML Document and Defining XML Attributes	1,2,4	5
4	Working with XML Parsers	1,2,4	5
5	Implementation of query optimization	1,4	5
6	Implementations of two phase or three phases commit protocol	1,4	5
7	Implementations of deadlock detection in DDB	1,2	5
8	Mini Project	1,2,3,4	5
Total Marks			40

References:

1. Chhanda Ray , “Distributed Database System”, Pearson Education India.
2. A. Siberschatz, H. Korth, “Database System”, Six Edition, McGraw Hill.
3. Seed K. Rahimi and Frank S. Haug, “Distributed Database Management System”, Wiley India.
4. M. Tamer Ozsü , Patrick Valduriez, “Principles of Distributed Database”, Pearson Education India.



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPCL604	Mobile Communication and Computing Lab	--	--	2	--	--	1	1
		Examination Scheme						
		ISE		ESE			Total	
				Practical	Oral			
40		20		-	60			

Pre-requisite Course Codes	CPC604 (Mobile Communication and Computing)
At end of successful completion of this course, student will be able to	
Course Outcomes	CO1 To Configure Wireless Access Point.
	CO2 To Execute WAP program.
	CO3 To Simulate different scenario using various simulators.
	CO4 To develop Mobile apps.

Exp. No.	Experiment Details	Ref.	Marks
1	To setup a wireless access point under given scenario.	1	5
2	To write and execute WML and WMLS program for different Scenario	2	5
3	To use GSM modem for executing AT commands in given scenario.	3	5
4	To simulate a given scenario using GNS3 Simulator.	4	5
5	To simulate GSM scenario using Netsim.	5	5
6	To simulate CDMA scenario using Netsim.	5	5
7	To develop a simple Android App.	6	5
8	To develop an Android App to Access the device hardware.	6	5
Total Marks			40

References:

- [1] Wireless Access point setup wizard by D-Link
“<http://www.support.dlink.com/emulators/dw12100ap/210/HomeWizard.html>”
- [2] Kris Jasma, “WML and WMLScript: A Beginner's Guide Beginner's Guides”, by Osborne publication
- [3] “GSM AT Commands Set”, by UbiNetics.
- [4] Chris Welsh, “GNS3 Network Simulation Guide”, by PACKT publication.
- [5] “Netsim Experiment Manual” by Tectos.
- [6] W. Frank Ableson, Robi sen, Chris King, “Android In Action”, Third Edition,