Vth Semester

COURSE STRUCTURE FOR B TECH IN COMPUTER SCIENCE & ENGINEERING

Semester V								B. Tech. in Computer Science & Engineering					
			Teaching Scheme					**Examination Scheme**					
Sr. No.	Course/ Lab Code	Course/Lab Name						**Theory**			**Practical**		**Total**
			L	T	P	C	Hrs./ Week	CE	MS	ES	LW	LP/ Viva	Marks
1	20CP301T	Computer Network	3	0	0	3	3	25	25	50	-	-	100
2	20CP301P	Computer Network LAB	0	0	2	1	2	-	-	-	50	50	100
3	20CP302T	System Software & Compiler Design	3	0	0	3	3	25	25	50	-	-	100
4	20CP302P	System Software & Compiler Design LAB	0	0	2	1	2	-	-	-	50	50	100
5	20CP303T	Software Engineering	3	0	0	3	3	25	25	50			100
6	20CP304T	Information Security	2	0	0	2	2	25	25	50	-	-	100
7	20CP304P	Information Security LAB	0	0	2	1	2	-	-	-	50	50	100
8	20CP305P	Introduction to Web Technology LAB	0	0	4	2	4	-	-	-	50	50	100
9		CE-1	2	0	0	2	2	25	25	50	-	-	100
10		CE-1 LAB	0	0	4	2	4	-	-	-	50	50	100
11		OE-3	3	0	0	3	3	25	25	50			100
12	20HS301P	Communication Skills-III	0	0	2	1	2				50	50	100
		TOTAL	16	0	16	24	32						1200

CE- Continuous Evaluation, MS-Mid Semester; ES – End Semester Exam

Professional Core Electives-1

Sl. No.	Course Code	Course Name	Track
1.	20CP306T	Data Mining	Analytics
2.	20CP306P	Data Mining Lab	Analytics
3.	20CP307T	Computer Graphics	Image Processing
4.	20CP307P	Computer Graphics Lab	Image Processing
5.	20CP308T	Distributed Systems	Parallel & Distributed Computing
6.	20CP308P	Distributed Systems Lab	Parallel & Distributed Computing
7.	20CP309T	Software Project Management	Software Engineering
8.	20CP309P	Software Project Management Lab	Software Engineering
9.	20CP310T	Advanced Java	Programming
10.	20CP310P	Advanced Java Lab	Programming

Open Elective-3 (Anyone to be offered)

Sl. No.	Course Code	Course Name	Track
1.	20CP311T	Introduction to Computer Security	Security
2.	20CP312T	Introduction to Data Mining	Analytics

20CP301T					Computer Network					
Teaching Scheme					**Examination Scheme**					
L	**T**	**P**	**C**	**Hrs/Week**	**Theory**			**Practical**		**Total Marks**
					MS	**ES**	**IA**	**LW**	**LE/Viva**	
3	0	0	3	3	25	50	25	-	-	100

COURSE OBJECTIVES

➢ To understand the overall communication system from sender to receiver
➢ To understand the various physical network devices and their working procedure as per OSI and TCP/IP protocols
➢ To understand the responsibility to each layer of TCP/IP
➢ To understand the several network applications such as email, peer2peer etc.

UNIT 1 DATA LINK LAYER   **11 Hrs.**

Introduction to computer networks and Internet, Layered Architecture (OSI and TCP/IP). Framing, Error Control Media access protocols (ALOHA, CSMA based), Ethernet 802.3, Token ring 802.5, Reliability Issue: sliding window.

UNIT 2 NETWORK LAYER   **10 Hrs.**

Internetworking and Routing: Best effort Service, Switching, Virtual Circuits, IP Addressing, Routing Issues, Distance Vector and Link State routing, OSPF, BGP.

UNIT 3 TRANSPORT LAYER   **12 Hrs.**

End to end delivery issues, Reliable data transfers, Congestion Control, Traffic engineering and Quality of service, TCP, UDP.

UNIT 4 APPLICATION LAYER   **6 Hrs.**

DNS, FTP, HTTP, SMTP, Socket Programming, Peer to Peer file sharing

                                                                                                                      Max. 39 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1- Identify the components required to build different types of networks
CO2- Discuss the functionality at each layer for given application
CO3- Illustrate the topological and routing strategies for an IP based networking infrastructure
CO4- Analyze traffic congestion methods in networks.
CO5- Explain the flow of information from one node to other in simple network.
CO6- Discuss various chat application using socket programming.

TEXT/REFERENCE BOOKS

1. Andrew S Tanenbaum, "Computer Networks", Pearson Education.
2. Behrouz A Forouzan, "Data Communication and Networking", McGraw Hill
3. William Stallings, "Data and Computer Communication", Pearson Education
4. James Kurose and Keith Rose, "Computer Networking: A Top Down Approach", Pearson Education

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs**
Part A: 10 Questions of 2 marks each-No choice   20 Marks
Part B: 2 Questions from each unit with internal choice, each carrying 20 marks   80 Marks

20CP301P					Computer Network LAB					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total
					MS	ES	IA	LW	LE/Viva	Marks
0	0	2	1	2	-	-	-	50	50	100

COURSE OBJECTIVES

➢ To prepare LAN cables for communication between sender and receiver
➢ To understand the working procedure of various physical network devices
➢ To visualize the responsibility to each layer of TCP/IP Protocol
➢ To implement the several network applications such as email, file transfer, peer2peer etc.

LIST OF EXPERIMENTS:
1. Get the Demo of all the network hardware such as Hub, switch, router etc.
2. To study and prepare LAN cables (cross and straight), to configure LAN and perform Static Routing
3. Introduction to Socket Programming- Design and Implement client-server elements of a few network applications
e.g. Echo client and server, Time client and server, Online Quiz and Buzzer Application, etc.
4. Configure DHCP in a small LAN and understand its functionality using Wireshark/ Packet Tracer
5. Configure DNS in a small LAN and understand its functionality using Wireshark/ Packet Tracer
6. Understand functionality of HTTP using Wireshark/ Packet Tracer
7. Understand functionality of TCP and UDP using Wireshark/ Packet Tracer
8. Configure virtual LAN and understand its functionality using Wireshark/ Packet Tracer
9. Configure OSPF and BGP in a small LAN
10. Simulation of TCP/UDP connections and performance analysis

COURSE OUTCOMES
On completion of the course, student will be able to
CO1- Choose different networking components as per the applications.
CO2- Use Wireshark tools to analyze network packets.
CO3- Apply the topological and routing strategies for an IP based networking infrastructure.
CO4- Analyze flow control methods in communication.
CO5- Create virtual network using Cisco packet tracer simulation tools.
CO6- Design various chat application using socket programming.

TEXT/REFERENCE BOOKS
1. Andrew S Tanenbaum, "Computer Networks", Pearson Education.
2. Behrouz A Forouzan, "Data Communication and Networking", McGraw Hill

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 2 Hrs**
Part A: Evaluate the continuous performance based on the lab work   50 Marks
Part B: Verify the performance using viva and critical experiment   50 Marks

20CP302T					System Software & Compiler Design					
Teaching Scheme					**Examination Scheme**					
					Theory			**Practical**		**Total**
L	**T**	**P**	**C**	**Hrs/Week**	**MS**	**ES**	**IA**	**LW**	**LE/Viva**	**Marks**
3	0	0	3	3	25	50	25	-	-	100

COURSE OBJECTIVES

- ➢ Define and learn system Software such as Assemblers, Loaders, Linkers, macro-preprocessors.
- ➢ Familiarize with source file, object file and executable file structures and libraries.
- ➢ Describe the front-end and back-end phases of compiler and their importance to students.
- ➢ Learn Lexical Analysis, Syntax Analysis and Semantic Analysis.
- ➢ Learn to generate Intermediate Code and code optimization.

UNIT 1 LEXICAL ANALYSIS   **08 Hrs.**
Introduction to different phases of compiler, Alphabets And Tokens In Computer Languages, Representation, Token Recognition And Finite Automata, Implementation, Error Recovery.

UNIT 2 PARSERS, SDT   **18 Hrs.**
Syntax Analysis- Introduction, Role Of Parsers, Context Free Grammars Top Down Parsers, Bottom-Up Parsers, Operator-Precedence Parsing, Semantic analysis-Syntax Directed Translation.

UNIT 3 CODE GENERATION AND ASSEMBLER   **08 Hrs.**
Intermediate code generation and Code optimization, Introduction to System Software, Machine Architecture and m/c level representation of programs, Assemblers- MOT, Data structures in Pass1 and Pass2 assembler, forward and backward referencing, back-patching, target code generation

UNIT 4 LOADER AND LINKER   **05 Hrs.**
Loaders and Linkers: Basic Loader Functions, Machine Dependent Loader Features, Machine Independent Loader Features, Loader Design Options, Implementation Examples.

Max. 39 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1- Explain different phases of compiler.
CO2- Discuss and compare different parsing algorithms.
CO3- Illustrate Intermediate code generation.
CO4- Analyze different types of code optimization techniques.
CO5- Explain the working of linker and loader.
CO6- Compare pass1 and pass2 of assembler algorithm.

TEXT/REFERENCE BOOKS

1. Alfred V Aho, M S. Lam, R Sethi, Jeffrey D. Ullman. Compilers-Principles, Techniques and Tools, Pearson.
2. D. M. Dhamdhere, System software and operating system, TMH

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs**

Part A: 10 Questions of 2 marks each-No choice   20 Marks
Part B: 2 Questions from each unit with internal choice, each carrying 20 marks   80 Marks

Pandit Deendayal Petroleum University, Gandhinagar

20CP302P					System Software and Compiler Design LAB					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	-	-	-	50	50	100

COURSE OBJECTIVES

➢ Define and learn system Software such as Assemblers, Loaders, Linkers, macro-preprocessors.
➢ Familiarize with source file, object file and executable file structures and libraries.
➢ Describe the front-end and back-end phases of compiler and their importance to students.
➢ Learn Lexical Analysis, Syntax Analysis and Semantic Analysis.
➢ Learn to generate Intermediate Code and code optimization.

LIST OF EXPERIMENT

Lexical analyzer, parser, intermediate code generation, code optimization, Pass1 and Pass2 of assembler.
1. Write a LEX program to recognize valid arithmetic expression. Identifiers in the expression could be only integers and operators could be + and *. Count the identifiers & operators present and print them separately.
2. Write YACC program to evaluate arithmetic expression involving operators: +, -, *, and /
3. Develop, Implement and Execute a program using YACC tool to recognize all strings ending with b preceded by n a's using the grammar an b (note: input n value)
4. Design, develop and implement YACC/ C program to construct Predictive / LL(1) Parsing Table for the expression grammar. Design, develop and implement YACC/C program to demonstrate Shift Reduce Parsing technique for the expression grammar rules and parse the sentence: id + id * id.
5. Design, develop and implement a C/Java program to generate the machine code using Triples for the statement A = -B * (C +D) whose intermediate code in three-address form:
   T1 = -B, T2 = C + D, T3 = T1 + T2, A = T3
6. Write a LEX program to eliminate comment lines in a C program and copy the resulting program into a separate file, Write YACC program to recognize valid identifier, operators and keywords in the given text (C program) file.
7. Implement Pass1 of Assembler and generate the Intermediate code and target code,

COURSE OUTCOMES

On completion of the course, student will be able to
CO1- Identify token in the given input string using any programming language.
CO2- Apply different parsing algorithms to check whether the given string is valid or not.
CO3- Calculate the value of a mathematical expression using parsing algorithms.
CO4- Analyze pass1 and pass2 assembler algorithms.
CO5- Apply optimization techniques related to target code generation.
CO6- Design demo compiler.

TEXT/REFERENCE BOOKS

1. Alfred V Aho, M S. Lam, R Sethi, Jeffrey D. Ullman. Compilers-Principles, Techniques and Tools, Pearson.
2. D. M. Dhamdhere, System software and operating system, TMH

END SEMESTER EXAMINATION QUESTION PAPER PATTERN
Max. Marks: 100   **Exam Duration: 2 Hrs**

Part A: Evaluate the continuous performance based on the lab work   50 Marks
Part B: Verify the performance using viva and critical experiment   50 Marks

20CP303T					Software Engineering					
Teaching Scheme					Examination Scheme					
					Theory			Practical		Total Marks
L	T	P	C	Hrs/Week	MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	0	0	100

COURSE OBJECTIVES

➢ Understand systematic approach to the development, operation, maintenance, and retirement of software
➢ Utilize and exhibit strong communication and interpersonal skills, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams
➢ Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes

UNIT 1 INTRODUCTION & REQUIREMENT ANALYSIS   **10 Hrs.**

Introduction, Characteristics of Software, Software Myths, Software Development Life Cycles: Software Development Process, Requirement Analysis, Functional and non-functional requirements, The software requirements document and SRS standards, Requirements Engineering Process

UNIT 2 MODELLING & DESIGN   **10 Hrs.**

Design Concepts, Design Model, Software Architecture, Object oriented design, Design Patterns

UNIT 3 TESTING & QUALITY MANAGEMENT   **10 Hrs.**

Software Testing Strategies, Quality Concepts, Software Quality Assurance, The ISO 9000 quality standards, Software process improvement, CMMI Framework

UNIT 4 SOFTWARE MAINTENANCE & RISK MANAGEMENT   **9 Hrs.**

Maintenance & Reengineering, Risk management: Reactive vs Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

                                                                                       Max. 39 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1- Classify procedural, non-procedural and object-oriented programming language.
CO2- Identify software requirement of a project.
CO3- Apply software testing life cycle for software project.
CO4- Construct manual test cases for software project.
CO5- Explain software development process.
CO6- Describe various software maintenance & risk management strategies

TEXT/REFERENCE BOOKS

1. Roger S Pressman, Software engineering A practitioner's Approach, McGraw Hill
2. Ian Sommerville, Software Engineering, Pearson education.
3. Pankaj Jalote, Software Engineering, A Precise Approach, Wiley India.
4. Rajib Mall, Fundamentals of Software Engineering, PHI

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs**

Part A: 10 Questions of 2 marks each-No choice   20 Marks

Part B: 2 Questions from each unit with internal choice, each carrying 20 marks   80 Marks

20CP304T					Information Security					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	-	-	100

COURSE OBJECTIVES

➢ To understand the concept of security requirements, security attacks, and security policy.
➢ To understand the mathematical concepts for cryptographic algorithms.
➢ To understand the security mechanisms available to protect the data.
➢ To understand the security analysis of cryptographic algorithms.

10 Hrs.

UNIT 1 INTRODUCTION AND NUMBER THEORY
Basics of Information Security, Classical Ciphers and Cryptanalysis, Introduction to Steganography. Introduction to Number Theory.

UNIT 2 SYMMETRIC KEY CRYPTOGRAPHY **10 Hrs.**
Feistel Structure, Advanced Encryption Standard, Data Encryption Standard, Modern Block Ciphers, Modes of Operation, Synchronous and Asynchronous Stream Ciphers, Use of Modern Block Ciphers and Stream Ciphers.

UNIT 3 PUBLIC KEY CRYPTOGRAPHY **10 Hrs.**
Introduction to Public Key Cryptography, Diffie-Hellman Key Exchange, RSA Cryptosystem, RSA Cryptanalysis. Elliptic Curve Cryptography.

UNIT 4 HASH FUNCTION AND DIGITAL SIGNATURE **09 Hrs.**
Introduction to Hash Function, MD5, SHA, Message Authentication Code, Digital Signature, Authentication Protocols.

Max. 39 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1- Differentiate between cryptography and cryptanalysis.
CO2- Explain the mathematical concepts for cryptographic algorithms.
CO3- Apply symmetric encryption techniques for data security.
CO4- Analyze the security strength of public key cryptosystem.
CO5- Use Hashing algorithm for Digital signature.
CO6- Express the importance of authentication protocols.

TEXT/REFERENCE BOOKS

1. William Stallings, "Cryptography and Network Security Principles and Practice", Pearson Education
2. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill Education
3. Behrouz A. Forouzan, "Cryptography and Network Security", McGraw-Hill Education
4. Wenbo Mao, "Modern Cryptography: Theory and Practice", Prentice Hall.
5. Bruce Schneier, "Applied Cryptography: Protocols, Algorithms, and Source Code in C", Wiley Computer Publishing.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs**
Part A: 10 Questions of 2 marks each-No choice   20 Marks
Part B: 2 Questions from each unit with internal choice, each carrying 20 marks   80 Marks

20CP304P					Information Security LAB					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory		Practical			Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	-	-	-	50	50	100

COURSE OBJECTIVES

- ➢ To understand the concept of security requirements, security attacks, and security policy.
- ➢ To understand the mathematical concepts for cryptographic algorithms.
- ➢ To understand the security mechanisms available to protect the data.
- ➢ To understand the security analysis of cryptographic algorithms.

LIST OF EXPERIMENT

1. Download and Practice Cryptool.
2. Study and Implement program for Ceaser Cipher with Encryption, Decryption, Brute Force Attack, and Frequency Analysis functions.
3. Study and Implement a program for Transposition (Columnar) Cipher to encrypt and decrypt the message.
4. Study and Implement a program for Rail Fence Transposition Cipher to encrypt and decrypt the message.
5. Study and Implement a program for Vigenère Cipher to encrypt and decrypt the message.
6. Study and Implement a program for 6x6 Playfair Cipher.
7. Study and Implement a program for n-gram Hill Cipher.
8. Use Crypto++ library to implement encryption and decryption functions for different block ciphers.
9. Study and Implement RSA Encryption and Decryption function.
10. Use RSA for generation and verification of digital signature on file.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1- Apply mathematical concepts for cryptographic algorithms.

CO2- Apply symmetric encryption techniques for data security.

CO3- Analyze the security strength of public key cryptosystem.

CO4- Use hash algorithm to implement digital signature.

CO5- Examine the authentication and hash algorithms as per security requirements.

CO6- Evaluate different security attacks on public/private key crypto-system.

TEXT/REFERENCE BOOKS

1. William Stallings, "Cryptography and Network Security Principles and Practice", Pearson Education
2. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill Education
3. Behrouz A. Forouzan, "Cryptography and Network Security", McGraw-Hill Education

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 2 Hrs**

Part A: Evaluation Based on the class performance and Laboratory book   50 Marks

Part B: Viva Examination based conducted experiments   50 Marks

Pandit Deendayal Petroleum University, Gandhinagar

20CP305P					Introduction to Web Technology LAB					
Teaching Scheme					**Examination Scheme**					
L	**T**	**P**	**C**	**Hrs/Week**	**Theory**			**Practical**		**Total Marks**
					MS	**ES**	**IA**	**LW**	**LE/Viva**	
0	0	4	2	4	--	--	--	50	50	100

COURSE OBJECTIVES

➢ Learn fundamentals of web development.
➢ Design the front-end of webpages.
➢ To introduce Client side scripting with Javascript.
➢ To introduce Server side programming with PHP and JSP.
➢ Demonstration of the data communication using AJAX, JSON and XML

Experiment Sessions using Programming would be based on following topics:
HTML, CSS, Javascript, PHP, XML Data Handling, AJAX technology, JSON objects, JSP

List of Experiments
1. Design the front pages of a website using HTML and CSS properties
2. Create the interactive webpages using Javascript
3. Install the LAMP stack
4. Implement the server-side scripting using PHP language
5. Create a web page that retrieves and displays information from the XML file.
6. Create a web page that retrieves and displays information from a JSON file.
7. Implement the web applications using PHP and add the AJAX feature into it.
8. Design the webpages using JSP

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 – Learn the Web Design Concepts including WWW, HTTP protocol and Browser.
CO2 – Understand the design and style concepts of webpages using HTML and CSS
CO3 – Implement Javascript functionality to make interactive webpages
CO4 – Illustrate server side scripting with PHP and JSP.
CO5 – Assess the data communication delay between webserver and client using AJAX with XML and JSON.
CO6 – Build a complete web solution for a given problem statement

TEXT/REFERENCE BOOKS
1. Laura Lemay, Rafe Colburn, Jennifer Kyrnin, Teach Yourself HTML, CSS & JavaScript Web publishing, Pearson Education, 2015
2. Steven Holzner, *The Complete Reference PHP*, Tata McGraw-Hill, 2008
3. Lorna Jane Mitchell, *PHP Web Services*, O'Reilly Media, 2013
4. Hans Bergsten, *Java Server Pages*, O'Reilly, 2003

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 2 Hrs**
Part A: Evaluation Based on the class performance and Laboratory book   50 Marks
Part B: Viva Examination based conducted experiments   50 Marks

Department Professional Electives- (V Semester)